This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

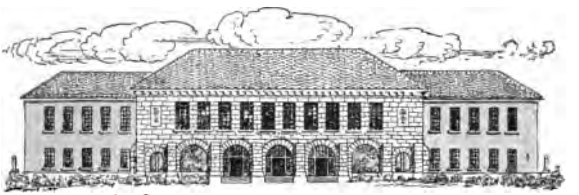
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

VIRGINIA PUBLIC SCHOOLS

VIRGINIA EDUCATION COMMISSION
AND VIRGINIA SURVEY STAFF

EDUCATIONAL SURVEY SERIES



SCHOOL OF EDUCATION
LIBRARY

STANFORD UNIVERSITY
LIBRARIES

Truman L. Kelley

DEPARTMENT OF
EDUCATION
RECEIVED
DEC 14 1927
LELAND STANFORD
JUNIOR UNIVERSITY

EDUCATIONAL SURVEY SERIES

Virginia Public Schools

A Survey of a Southern State Public School System

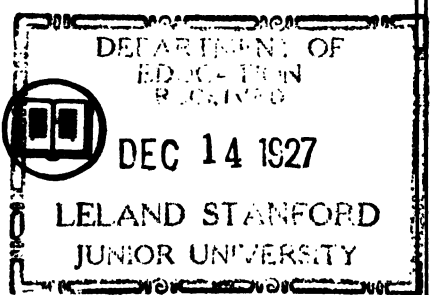
By THE VIRGINIA EDUCATION COMMISSION
HARRIS HART, PRESIDENT

and

THE VIRGINIA SURVEY STAFF
ALEXANDER J. INGLIS, DIRECTOR

IN TWO PARTS

PART TWO—EDUCATIONAL TESTS



YONKERS-ON-HUDSON, NEW YORK
WORLD BOOK COMPANY
1921

WORLD BOOK COMPANY

THE HOUSE OF APPLIED KNOWLEDGE

Established, 1905, by Caspar W. Hodgson

YONKERS-ON-HUDSON, NEW YORK

2126 PRAIRIE AVENUE, CHICAGO

Publishers of the following professional works: School Efficiency Series, edited by Paul H. Hanus, complete in thirteen volumes; Educational Survey Series, nine volumes already issued and others projected; School Efficiency Monographs, twelve numbers now ready, others in active preparation

647984

BSS: VPS: 2—1

Copyright, 1921, by World Book Company

All rights reserved

VIRGINIA EDUCATION COMMISSION

State Superintendent Harris Hart, President.

Hon. Franklin Williams, Secretary.
Senator C. O'Conor Goolrick.
Senator G. Walter Mapp.
Hon. Charles H. Rolston.
Professor Charles G. Maphis.
Miss Bessie Taylor.
Superintendent Blake T. Newton.

THE SURVEY STAFF

DIRECTOR

Dr. Alexander J. Inglis, Harvard University.

DIVISION SPECIALISTS

Dr. M. E. Haggerty, University of Minnesota, in charge of the Division of Tests.
Mr. G. A. Mirick, Harvard University.
Dr. W. E. Johnson, State College of South Dakota.
Dr. F. S. Breed, University of Chicago.
Mr. Jackson Davis, Field Agent of the General Education Board.
Dr. M. E. Noonan, Harris Teachers' College.
Mrs. C. E. Flemming, Wisconsin State Department of Education.
Dr. L. H. Ziegler, University of Minnesota.
Mr. Earl Hudelson, West Virginia University.
Dr. M. E. Brydon, Virginia State Department of Health.

SPECIAL COLLABORATORS AND MEMBERS OF FIELD STAFF

Prof. J. E. Avent, Radford State Normal School.
Dr. D. B. Bryan, Richmond College.
Prof. A. B. Chandler, Jr., Fredericksburg State Normal School.
Prof. W. B. Coggin, Radford State Normal School.

MR. S. P. DUKE, State Supervisor of High Schools.
MR. T. D. EASON, State Supervisor of Agriculture.
PRINCIPAL J. M. GANDY, Virginia Normal and Industrial Institute.
PROF. J. R. GEIGER, College of William and Mary.
MR. J. N. HILLMAN, State Supervisor of Teacher-Training.
MR. W. T. HODGES, State Supervisor of Rural Schools.
DR. H. G. HOTZ, College of William and Mary.
MR. R. V. LONG, State Supervisor of Industrial Education.
PROF. J. L. MANAHAN, University of Virginia.
PROF. C. G. MAPHIS, University of Virginia.
PRINCIPAL F. D. MORTON, Manassas Industrial Institute.
PROF. M. D. PIERCE, Farmville State Normal School.
DR. W. T. SANGER, Harrisonburg State Normal School.
PROF. G. T. SOMERS, Farmville State Normal School.
PROF. W. F. TIDYMAN, Farmville State Normal School.
PROF. B. Y. TYNOR, Fredericksburg State Normal School.
MR. E. E. WORRELL, State Rural Supervisor.
MR. A. D. WRIGHT, State Supervisor of Colored Schools.

SPECIAL CONSULTANTS AND ADVISERS

DR. J. H. DILLARD, President of the Jeanes and Slater Funds. (Negro Education.)
PROF. P. H. HANUS, Harvard University. (Educational Administration.)
DR. T. J. JONES, Bureau of Education, Washington, D. C. (Negro Education.)
DR. L. M. TERMAN, Leland Stanford University. (Tests and Measurements.)
DR. G. P. PHOENIX, Hampton Institute. (Negro Education.)
DR. W. R. SMITHEY, Secretary of the State Board of Education. (Statistics.)
DR. E. G. WILLIAMS, State Health Commissioner. (School Hygiene and Physical Education.)
MR. W. T. B. WILLIAMS, Field Agent of the Jeanes Fund. (Negro Education.)
DR. R. M. YERKES, National Research Council. (Tests and Measurements.)

PREFACE

THE tests upon which the discussions of this volume are based were given in connection with the survey of the public schools of Virginia in the early part of 1919. The general program of work was determined upon by the Director of the survey and Dr. M. E. Haggerty in conference with Dr. L. M. Terman and Dr. Robert M. Yerkes. The details were developed and carried out by Dr. Haggerty and the following staff of assistants: Dr. F. S. Breed, University of Chicago; Mrs. C. W. Flemming, Wisconsin State Department of Education; Mr. E. H. Hudelson, West Virginia University; Dr. H. G. Hotz, College of William and Mary; Dr. W. E. Johnson, State College of South Dakota; Dr. M. E. Noonan, Harris Teachers College; Mr. L. H. Ziegler, University of Minnesota, and Mrs. L. H. Ziegler, University of Minnesota.

In the giving of tests all of these persons participated, and in this they were assisted by a large number of local school officers, members of the State Department of Education, and members of the faculties of normal schools and colleges in Virginia.

Of the report herewith presented, Chapter III was prepared by Mrs. Flemming, Chapter IV by Dr. Noonan, and Chapters VI and VII by Dr. Breed. Dr. Breed also had a major part in planning the tests in spelling and handwriting. Chapter XI was prepared by Mr. Hudelson, and the material for Chapter XII was prepared by Dr. Hotz. For the general plan of the report and the remaining chapters Dr. Haggerty is responsible.

CONTENTS

PART 2. EDUCATIONAL TESTS

PAGE

INTRODUCTION ix

CHAPTER

I. MEASUREMENT PROGRAM 1
The character of the tests — Scope of the survey

II. SUMMARY OF RESULTS AND RECOMMENDATIONS 7
General considerations — The seven-grade-school course — Results — Reading — Arithmetic — Spelling — Handwriting — The one-room school — Colored schools — High school — Recommendations

III. READING 14
Questions to be answered — A. City schools (white) — B. Rural schools (white) — C. City schools (colored) — D. Rural schools (colored) — E. Analysis of city records — F. Analysis of class and individual records — G. Summary — H. Improvement of silent reading in Virginia schools — Summary of recommendations for improvement of the work in reading in Virginia city schools

IV. PRIMARY READING 45

V. ARITHMETIC 52
The tests used — The data used — The organization of the data — The technique of comparative scores — The fundamentals in Virginia cities — Harrisonburg — Rural white schools — The one-teacher school — Arithmetical reasoning — General conclusions — Recommendations

VI. HANDWRITING 70
Directions for administering the test — Scoring the samples — Selecting and training the scorer — Statement of various types of schools — The reliability of the results — Individual differences and the classification of pupils — Recommendations

VII. SPELLING 91
The spelling test — Results — Recommendations

VIII. BASIS FOR GROUPING ELEMENTARY SCHOOL PUPILS 114
Statistical inquiry as to value of methods — Criteria for evaluating tests — Intelligence examination Delta 2 — Discriminative capacity of intelligence examination, Delta

CHAPTER PAGE

2 — Reliability of the general intelligence examination, Delta 2 — The significance of intelligence examination, Delta 2 — Relative value of classification measures — Emphasis upon addition in Richmond schools — Standards and norms for intelligence examination, Delta 2 — Second grade examinations — Discriminative capacity of reading examination, Sigma 1 — Reliability of reading examination, Sigma 1 — Significance of the reading examination, Sigma 1 — Standards and norms for reading examination, Sigma 1 — Intelligence examination, Delta 1 — Discriminative capacity of intelligence examination, Delta 1 — Reliability of intelligence examination, Delta 1 — Significance of intelligence examination, Delta 1 — Standards and norms for intelligence examination, Delta 1 — Teacher's ratings

IX. How Virginia Children are Grouped 157

Individual classes — Examination of larger groups — Intelligence examination, Delta 2 — Overlapping — City schools — Reading examination, Sigma 1 — Intelligence examination, Delta 1 — Improvement of school grading — Remedial measures — Special classes for backward pupils — Classes for gifted children — Bureaus of educational research

X. The One-Teacher School 193

Recommendations

XI. High-School Composition 198

Sample compositions — Conclusions — Recommendations — Virginia Supplement to the Hillegas Scale for the Measurement of Quality in English Composition — Sample compositions

XII. Elementary Algebra 223

Index 231

INTRODUCTION

IN the Virginia Survey the Division of Tests was created with three major ends in view. Its work was designed: first, to measure by standard tests the results of instruction; secondly, to establish standards of accomplishment for certain educational conditions peculiar to the South and exemplified in Virginia; thirdly, to stimulate teachers and others in the state to an increased interest in and understanding of the modern educational methods involved. These three projects appeared to warrant the introduction into a state survey of an instrument which had already proved its value in many city and local surveys.

The first of these projects produced the results which are set forth in this volume. The material presented gives an impartial and objective view of the results of instruction in Virginia. By standardized objective tests more than sixteen thousand school children in various types of schools and in different parts of the state were examined in the fundamental studies and in general mental ability. The body of evidence produced should be of great value in judging the effectiveness of instruction and of grade organiation.

The second project involved the establishment of standards for certain educational conditions found in the South. By far the major part of standard tests and scales available for educational measurement have been established on the basis of urban conditions in the North, West, and Middle West. Education in the South presents several educational conditions not found elsewhere in the country, at least in the same form or in the same degree. Especially noteworthy are the following facts: (*a*) the school system in Southern states, with few local exceptions, is organized on the basis of a seven-grade elementary school followed by a four-grade high school, in contrast with the eight-grade elementary school and four-grade high school which is standard in most parts of the country; (*b*) the education of negroes is an important problem in the South; (*c*) the educational problems of Virginia, and of the South in general, are primarily those of the

small rural school of a type not closely paralleled even in other parts of the United States which are dominantly rural; (*d*) short school terms and poor attendance are not peculiar to Virginia or to the South, but they play a much larger part in educational problems there than in most states; (*e*) the use of standard tests and scales has not developed to any great extent in the South — in part, no doubt, because existing tests and scales are organized on the basis of an eight-grade elementary school and are not readily translated into terms of a seven-grade elementary school course.

For these reasons it appeared desirable to translate existing tests and scales into terms of conditions found in the South and to establish certain new standards adapted to the conditions met. This was necessary, in fact, if any serious attempt was to be made to apply standard tests and scales in the Virginia Survey. Results of this project were those typified by the establishment of such tests as the Virginia General Intelligence Examinations (Delta 1 and Delta 2), the Virginia Reading Test for grades one to three (Sigma 1), and the Virginia Supplement to the Hillegas Scale for the Measurement of Quality in English Composition. Further results were the determination of some standards for existing tests and scales in terms of typically Southern conditions obtaining in Virginia. Of particular importance was the determination of standards for the seven-grade elementary school and of certain standards for colored children.

The third project of the Division of Tests was to stimulate the teachers and people of Virginia to an increased interest in and understanding of the educational methods of standard tests. With this end in view more than three hundred fifty teachers and educational officers were brought into direct participation in the program of testing, and many more teachers came into direct contact with that work as the testing was carried on in schools throughout the state. Beyond question one of the most important results of the survey is found in the increased understanding of the character of methods involved and their place in education. No other part of the survey has contributed so much to that result as the Division of Tests. A signal instance of this is

found in the project just completed in the city of Winchester, where the entire elementary school and the junior high school have been reorganized on the basis of tests given during the fall of 1919 — a direct result of the stimulus given by the Division of Tests.

In the judgment of the writer any state educational survey should accomplish two ends. It should present such evidence of the status of the schools as may lead to necessary action for improvement by the state legislature, the state school authorities, and local officers, thus making the improvement of education possible. If, however, such improvements are to be made actually effective, they must be carried over into practice by the teachers and people of the state. Hence, the second end of a school survey involves the dissemination of information, the stimulation of interest, and the development of an understanding of the best educational methods, so that a permanent force may operate toward the continuous improvement of education. To both of these ends the Division of Tests has made great contributions.

Provision for a Division of Tests in the Virginia Survey marked the beginning of a program of testing in a state survey of this type. Few people realize the difficulties of organizing and administering any comprehensive program of testing with limited funds and under the conditions obtaining in such a state as Virginia, where schools are predominantly small schools in rural communities, sometimes all but inaccessible. The task undertaken by Dr. Haggerty and his staff was an extremely difficult one. Nevertheless, it was organized and administered in a masterly fashion, and the same discouraging conditions which they were obliged to face were successfully overcome. In many respects the program of testing in the Virginia Survey was the most comprehensive program of school testing yet undertaken. That it was carried out so successfully is a great tribute to Dr. Haggerty and his associates.

The introduction of a program of tests would have been impossible without the coöperation of the General Education Board. Its appropriation of ten thousand dollars for con-

ducting the tests and of two thousand five hundred dollars for statistical work and printing made it possible to carry out this important part of the survey work. That financial support was supplemented by valuable advice and assistance on the part of the Board's officers.

ALEXANDER INGLIS,
Director of the Virginia Survey

VIRGINIA PUBLIC SCHOOLS

EDUCATIONAL TESTS

CHAPTER I

MEASUREMENT PROGRAM

READING, writing, arithmetic: through all the changing conceptions of education these remain the fundamental aims of instruction in the elementary school. Language and figures are the basic tools of civilized life at every level and for every bit of higher education to which individuals and society may aspire. No school can be efficient if it does not teach these things well; any school which does teach them well justifies its cost in social and individual service rendered.

A valid survey of any school must, therefore, inquire how well the pupils are learning to read, how well they add, subtract, multiply and divide, how well they express their own ideas. Any interested parent will make these inquiries about the schooling of his own child. As an intelligent citizen he may ask these questions about other children than his own, and as a responsible public official he may demand to know in the most accurate possible terms just where the schools of his state stand in the service they are rendering to the children of that state.

To find an answer to these and related questions the Division of Tests and Measurements was called into existence by the Virginia Education Commission. The Division was directed to use both educational and psychological tests in the study of its problems. The work was begun with an examination of grades three to seven in the rural schools of seventeen selected counties (Albemarle, Amelia, Appomattox, Caroline, Carroll, Charlotte, Giles, Greensville, Henrico, Isle of Wight, Lancaster, Loudoun, Northampton, Rockingham, Smyth, Stafford, and Wise). Tests were later given in grades one, two, and three of certain rural schools. The work thus begun in the rural schools was extended to the schools in eight representative

cities (Charlottesville, Danville, Lynchburg, Newport News, Norfolk, Portsmouth, Richmond, and Roanoke), where children of all elementary grades were examined. Finally, a survey was made of certain first-year work in twenty-five high schools of the state.

THE CHARACTER OF THE TESTS

For examinations of the type conducted in the Virginia Survey, it is desirable to use standardized tests. Such tests differ in several ways from the ordinary examination set by a teacher, chiefly in that they are more carefully prepared and have been given to large numbers of children in widely scattered communities, so that the examiners already know in definite mathematical terms how high a score pupils of a particular age or grade should make. Standard tests of this type were used for measuring the achievement of children in reading, spelling, handwriting, English composition, arithmetic, and algebra. Following is the list of achievement tests upon the results of which the conclusions of this volume are based:

Subject	Name of Test or Scale Used	In Grades*
Reading.....	Thorndike Reading Scale Alpha 2.....	3–7
	Virginia Reading Test Sigma 1.....	1–3
	Virginia General Examination Delta 2,† Exercise I.....	3–7
Spelling.....	Ayres Spelling Scale.....	3–7
Handwriting.	Starch Scale for Measuring Handwriting....	3–7
Arithmetic...	Woody Arithmetic Scales, Series B.....	3–7
	Courtis Standard Arithmetic Test, Series B	3–7
	Virginia General Examination Delta 2†, Exercise II.....	3–7
Composition.	Nassau County Supplement to the Hillegas Composition Scale.....	H.S.I.
Algebra.....	Hotz's First Year Algebra Scales, Series A, Addition and Subtraction, Equation and Formula.....	H.S.I.

* A few schools in Virginia have eight-grade elementary schools, and in them all tests given in the seventh grade were also given in the eighth grade.

† Originally designated Delta 1, and so designated in Part 1 of the Virginia Survey.

The psychological tests were designed to secure information supplementary to that yielded by the foregoing achievement tests and scales. Three separate intelligence examinations were used. The first, known as Delta 2, is a modification of the army intelligence examinations. The modifications consist essentially in a selection of those parts of the army examinations suitable for the elementary grades (three to eight) and the first year of high school, and the addition of other similar items. For grades one and two a special examination known as Delta 1 [1] was arranged. Both of the foregoing examinations were given to the children in groups. For the individual examinations an abbreviated form of the Stanford Revision of the Binet-Simon tests (Delta 3) was used. Finally, each teacher whose pupils were examined, filled in a teacher's record of pupils (Delta 4), giving the name, age, grade, and years in school of each child, together with her personal estimate as to his scholarship, industry, and general intelligence.

Near the close of the survey it became possible to cooperate with the National Research Council in giving a series of twenty tests to pupils who had already been examined by the survey tests. The results of these tests were available to the survey staff for the light they might throw on the results of the survey tests proper.

SCOPE OF THE SURVEY

In giving the tests it was the general practice in the intermediate and upper grades to require one half day of the pupil's time. This time was distributed over tests in spelling, handwriting, arithmetic, reading, and Delta 2, with necessary intermissions between tests. For the two primary grades the time, inclusive of intermissions, was about one and a half hours. In many of the schools the examiners returned on later days and gave additional tests. The information available, therefore, for each child is what a well-trained and experienced person with well-developed methods could gain in from one and a half to three hours of definite examination. In

[1] Originally designated Delta 7 and so designated in Part 1 of the survey report.

some cases it is much more than this because certain classes figured in the examinations more than once. This is particularly true of third-grade classes, some of which were examined with both the higher and lower grade children. It is also true of most of the children who were given Stanford-Binet tests.

All of the tests noted in the previous section, excepting the Stanford-Binet tests, were available for group examination, twenty-five or even more children being examined at one time. Because of this it was possible to include a large number of schools and many different pupils in the survey and by this means to get the data from many different localities representing a wide variety of school conditions.

Since it was impossible in the time available to examine any large percentage of the schools of the state, special effort was made to select for examination those schools which would fairly represent the major school conditions in the state, and in the schools examined a number of children sufficient to represent all were tested. In the beginning, the counties in which the examinations were to be given were carefully chosen so as to get some in which the very best school work in the state is being done, some in which the schools are most in need of improvement, and others in which the school work is of intermediate quality. Similarly, within each school division the schools to be examined were selected so as to get fair samples of all the work in the division. It was desired that the results of the test should give a fair picture of all the school work in the state, good, poor, and mediocre. That they do give such a picture is the judgment of the many school officers in the state who are familiar with the methods by which the examinations were made.

The scope of the survey may be appreciated by the fact that about sixteen thousand different children were examined with from six to forty tests each. Of these sixteen thousand children about five thousand were in grades three to seven of rural white schools. More than one thousand were in grades one and two of these same schools. The additional six thousand white children were in grades one to seven (or eight) of urban schools and in the first year of twenty-five urban and rural high schools. In all, about three thousand

colored children were examined, fifteen hundred of whom were in rural schools and one hundred fifty of whom were in the first year of the colored high schools of Richmond city and Norfolk city. For comparative purposes all the children in the Whittier School at Hampton Institute were examined.

The testing in grades three to seven of the rural schools was done between March 17 and April 20, 1919. The tests in city schools were completed for these grades within ten days thereafter, and the testing of grades one and two came late in May. The giving of these tests required the entire time of the staff of six persons for two months and the time of thirty others who worked from one to four weeks each under the direction of the staff. The latter group of persons were chiefly school superintendents and principals in Virginia, members of the State Department of Education, and members of the faculties of the normal schools and colleges of the state.

To give any school examination with justice to all pupils is a difficult matter. This fact was recognized from the beginning, and care was taken in planning the work to provide as nearly as possible the same conditions in every room where the examination was given. The same tests were used, and very detailed written instructions were prepared for the examiners so that all could follow the same procedure. For the preliminary training of examiners five institutes of two or more days each were held. At these institutes there was a general discussion of the tests, and each prospective examiner practiced giving the tests under criticism until his procedure was standardized.

The training of local helpers had two aims. The first was to secure a sufficient number of examiners to carry through the survey in the allotted time. The second was to develop among the local school officers an intelligent interest and appreciation of the survey itself and to build up in the state of Virginia a corps of men and women able and willing to carry forward the type of examination and diagnosis which the survey initiated.

It was with the same double purpose that scoring centers were organized at the higher educational institutions of the

state. Four state normal schools, the University of Virginia, the College of William and Mary, Richmond College, and Randolph-Macon College for Women joined in the work of scoring. The tests were shipped to these places, and a member of the survey staff devoted from two days to a week at each place training a staff of local workers — advanced and graduate students — to mark test papers and tabulate results. Following this training the work proceeded under the direction of one or more members of the faculty. A system of checking was employed to guarantee accuracy of results. The work was later checked by the survey staff.

It is believed that by inducing this local coöperation the survey has rendered a service to the state of Virginia entirely independent of whatever value may accrue from the published results. About two hundred and fifty prospective teachers, fifty teachers now in service, twenty public school administrators, and twenty-one professors in normal schools and colleges engaged from one week to two months each in the giving and scoring of tests. These remain in the school system to utilize and carry forward the work begun by the survey staff.

CHAPTER II

SUMMARY OF RESULTS AND RECOMMENDATIONS

GENERAL CONSIDERATIONS

OUTSTANDING conditions influencing the product of the public schools of Virginia have been detailed in Part 1 of the survey report.[1] Certain of these conditions have a direct bearing upon the results of the tests and may be here recalled. Chief among those contributing to lower the product of the schools, particularly of the rural schools, are the following: (*a*) the irregular entrance of pupils into schools and their irregular attendance thereafter — conditions which lead to non-promotion, excessive overageness, and elimination from school before the completion of the elementary course; (*b*) the short school term which prevails in many districts; (*c*) the lack of a sufficient number of well-trained teachers; (*d*) the large number of one-room schools; (*e*) the absence of uniform standards of achievement for the fundamental subjects in the elementary grades; (*f*) the inadequacy of methods of classifying children in school; (*g*) the dearth of special classes for unusual children, and (*h*) the inadequacy of supervision. Lying back of all these is the inadequate financial support which the schools receive. The one-room school, the grouping of pupils, special classes, and definite standards of achievement will receive fuller treatment in this volume in connection with the report of the tests. This report will not fail also to call attention to the evidences of good school conditions and good school products.

THE SEVEN-GRADE-SCHOOL COURSE

Before proceeding to a detailed examination of the test results, attention should be called to one condition common to most of the schools in Virginia — and the Southern states generally — but in which Virginia schools differ from most of the schools of the North and West. This is the fact that Virginia attempts to cover the elementary course in seven

[1] *Virginia Public Schools*, Part 1, especially Chapters I-VIII, XIV-XV, XXI.

school years, whereas, for most of the country, an eight-year elementary course is standard. It is correct to say Virginia "attempts to cover," since the evidence shows that in most schools of the state the "attempt" does not become an accomplished fact. Most children take a full eight years to complete the elementary course, the white pupils in non-city schools of Virginia being from one half year to one year above the national standard age for each of the elementary school grades. Colored children are still older. Even in the cities where the best school conditions prevail, the average age of fifth-grade white children is 10.9 years, and the average age of colored children is 12 years. Of one hundred eleven-year-old children in the city of Richmond, all of whom should have been in school either four and one half or five years and have been in the low fifth or high fifth grade, more than sixty per cent had not yet reached that grade. Thirty per cent were still below the low fourth grade.

Notwithstanding this fact of excessive overageness, the assumption is that Virginia children do their elementary school course in seven years, and in school they are classified either in seven (year-grade) groups or in fourteen (half-year-grade) groups.

If we may regard the elementary school course as a fairly fixed quantity, we may say that Virginia attempts to do in seven years what most schools attempt to do in eight. On this assumption one year of the elementary schools in Virginia on the average equals one and one-seventh years in the eight-year system. This may be seen graphically in Figure 1, where the horizontal line represents the duration of the elementary school course.

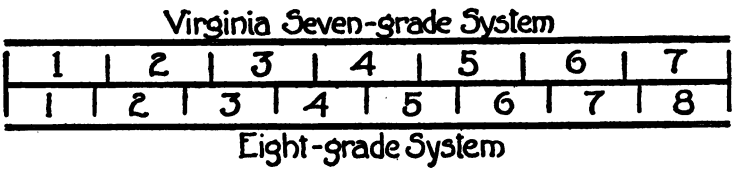


FIG. 1. Complete elementary school course represented by heavy central line. Divisions above line show the units in a seven-grade system (the Virginia program). Divisions below line show the units of the usual eight-grade system.

The divisions on the upper side of the line represent the yearly units of the seven-grade course, and those on the lower side of the line show the yearly units of the eight-grade course. It will be seen from the figure that a seventh-grade Virginia score should not merely equal a seventh-grade score in the eight-grade system — it should equal an eighth-grade score, since in both systems the children at the end of these respective years are completing their elementary schooling. Similarly, a sixth-grade Virginia child should fall but little short of a seventh-grade score of an eight-grade system, and so on down the grades. The table of equivalents is as follows:

Seven-grade System		Eight-grade System
1 grade	equals	1 1/7 grades
2 grades	equal	2 2/7 "
3 "	"	3 3/7 "
4 "	"	4 4/7 "
5 "	"	5 5/7 "
6 "	"	6 6/7 "
7 "	"	8 "

This relationship is important to keep in mind since most of the available grade norms in standard tests are made for an eight-grade system.

RESULTS

Now that the plan and scope of the survey have been explained and some of the general considerations affecting the results have been set forth, it may simplify the further reading of this volume if the most important results of the survey are briefly summarized at this place.

The reader who desires frankly stated conclusions will find them here. If, in addition, he wishes some amplification of the grounds upon which these conclusions are based, together with the detailed statistical evidence, he will find such amplification in the succeeding chapters. In general, technical methods will not be explained in this volume, since all are to be found in the numerous texts now available.

First of all it should be said that the tests and measurements bring to light many good school conditions in Virginia. If this report seems to emphasize the deficiencies of the schools rather than their merits, it is because of the belief that if the defects are brought to light, they will be remedied and the school system be thereby improved.

READING

1. The children in the best Virginia city schools read as well as average children of the same age in Northern and Western cities.

2. The children of the rural schools in Virginia are from one half to one year older than the children in the city schools and have less reading ability — less by a half year's progress. The rural children are, therefore, from one year to a year and a half behind where they should be for their ages, as compared with the city pupils of Virginia and as compared with pupils outside of Virginia.

3. The median age of the seventh-grade city children tested by the Thorndike scale was fourteen years, which is just the median age of the eight-grade children in thirty-four Wisconsin cities. The Virginia group score is 7.3 and the Wisconsin group score is 7.3.

4. In the primary grades Virginia city children (Norfolk and Richmond) make an average showing in silent reading. Their poorest showing is in grade one, where in both parts of the Sigma 1 examination they fall distinctly below the median scores of five hundred first-grade children in a number of the good school cities of the country.

5. The primary children of the rural schools make scores distinctly inferior to those of the city schools, although they are practically of the same age. Eight-and-one-half-year-olds in the rural schools score 14.5; city children of the same age score 17.9. Children of the same age in cities outside of Virginia score 18.0.

6. The colored city pupils are one and a half years behind the city white pupils in reading achievement.

7. The reading achievement of colored children in rural

schools, age and grade considered, is very low. The pupils are greatly overage and read poorly.

ARITHMETIC

8. Virginia city children at the end of elementary school are less efficient in the fundamentals of arithmetic than the Woody standards require and less efficient than the children in most of the good schools throughout the country where the Woody tests have been given.

9. The rural schools make a poorer showing than do the city schools in the fundamentals of arithmetic.

10. The one-teacher rural white schools achieve only about half the product of good city systems.

11. The city and rural colored schools make lower scores than corresponding types of white schools, and the greater age of the pupils indicates a greatly inferior product.

SPELLING

12. Certain city white schools meet the standard attainment of typical American city systems, but as a group the Virginia city schools average two years behind the standard attainment of pupils in typical eight-grade city systems in spelling.

13. The poorest Virginia rural colored schools average almost four years behind the standard attainment of pupils in typical eight-grade city systems and almost two years behind the city white schools of Virginia.

HANDWRITING

14. In handwriting the Virginia city white children average one year short of the Starch standards at the end of the elementary school.

15. The rural four-teacher white schools are about three years below the Starch standards at the end of the elementary school.

16. The one-teacher white schools fall short of the four-teacher schools by about one year of progress.

17. The colored pupils in rural schools achieve results inferior to the scores of white pupils.

18. Colored pupils in city schools average a year's progress above that of white pupils in corresponding schools. In general they are about one year older.

CLASSIFICATION OF PUPILS

19. There is great overlapping in ability of the several school grades. This overlapping is greatest in rural schools.

20. This misgrouping of pupils is shown by both the achievement and intelligence tests.

21. The best available group measures of the overlapping are the general intelligence examinations Delta 1 (in grades one to three) and Delta 2 (in grades three to seven), and the reading examination Sigma 1 (in grades one to three).

22. There is almost no provision in the rural and city schools outside of Richmond for teaching backward children in special classes. Richmond has such classes. Entrance into these classes is determined, as it ought to be, by psychological examination, and the classes are taught by specially trained teachers.

23. Richmond is the only school district in the state making provision for the gifted children in special classes.

THE ONE-ROOM SCHOOL

24. By every measure applied the one-room school is the poorest educational institution in the state. The pupils in these schools are not getting a square deal.

COLORED SCHOOLS

25. The pupils in colored schools make a creditable showing in the tests, grade for grade, as compared with the white pupils. They are, however, almost uniformly from one to one and a half years older than the white children in the same grade and have been in school one year longer.

HIGH SCHOOL

26. The first-year white pupils in Virginia city high schools write English as well as do the children in ten cities measured by the Hillegas scale. They write better than the median of fifty-four cities reported by Trabue. They fall short of the Trabue standard.

27. The city senior high schools rank better in composition than do the city junior high schools.

28. The rural high schools rank better in composition than do the city junior high schools.

29. The rural high schools rank much below the city high schools in composition.

30. The pupils in the colored high schools are seven months older than those in the white high schools and score in composition about a year and a half below the pupils in the city senior high schools and two years below the Trabue tentative standard for the first year high school.

31. In algebra the Virginia scores are below the Hotz standard and below the median scores for the country.

32. The city schools do little better in algebra than do the accredited rural high schools.

33. The algebra work in the small non-accredited high schools is decidedly inferior in quality to that of the other high schools of the state.

RECOMMENDATIONS

Most of the recommendations to be made here were made in Part 1 of the survey report on the basis of other data than that of tests and measurements. They are corroborated and reënforced by the results of the tests. Chief among the necessary changes are: (*a*) the passage of an effective compulsory education law; (*b*) the lengthening of the school term to a one-hundred-eighty-day minimum; (*c*) improvement in the qualifications of teachers; (*d*) the increase of supervision, particularly of the rural schools; (*e*) a reduction of the one-room schools wherever possible in favor of consolidation; (*f*) the restriction of one-room schools to five grades; (*g*) improvement in the classification of children; (*h*) the organization of special classes for backward and superior children; (*i*) the employment of standard educational tests in measuring the progress of children and the efficiency of instruction; (*k*) the creation in the State Department of a bureau of educational investigation; (*l*) the creation of similar bureaus in all city and non-city divisions where conditions permit.

CHAPTER III

READING

THIS chapter will present the results obtained from the use of the Thorndike Reading Scale Alpha 2 with approximately nine thousand pupils in the Virginia elementary schools beginning with grade three.

The tests were given to more than nine thousand pupils, but some papers were rejected because of irregularities in the records or the absence of such supplementary facts as age, grade, race, etc. The returns used include the scores of 3768 white pupils from the eight cities, Charlottesville, Lynchburg, Newport News, Norfolk, Portsmouth, Rockford, Richmond, and Roanoke; 1029 colored pupils from six of these cities; 3038 white pupils from the rural schools in the counties indicated in Chapter I, and 1000 negro children from the rural schools of the following counties: Albemarle, Appomattox, Caroline, Charlotte, Isle of Wight, Lancaster, Loudon, Northampton, and Rockbridge.

QUESTIONS TO BE ANSWERED

The outstanding question to which such data should afford an answer is this: Are Virginia children under present school conditions learning to read satisfactorily? Explicit reply to this question demands an analysis of the gross results in terms of more detailed questions: (1) How well do the city schools teach their pupils to read? (2) Does the boy or girl in the one-room rural school learn to read as well as the pupil in the city schools? (3) Do the larger consolidated rural and village schools teach more effectively than does the one-room school? (4) How well are the colored boys and girls learning to read? (5) How do the scores made by the Virginia children in the rural schools or in the city schools compare with the results achieved by the children of Iowa, Wisconsin, and other places? (6) How nearly does the work of the several grades approach the quality indicated by Thorndike's standards as valid expectations for the several grades? (7) Do the children of

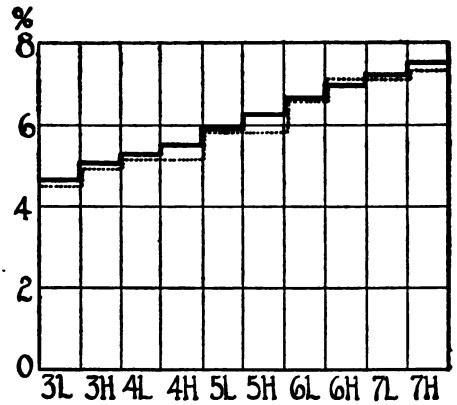


FIG. 2. Thorndike Reading Scale Alpha 2. Full-drawn line: estimated half-year norms for seventh-grade system; dotted line: median scores for eight Virginia cities (April, 1919).

Virginia acquire in the seven-grade elementary school a skill in silent reading equal to that gained by pupils who complete the elementary course in schools having an eight-year course? (8) Do they acquire such skill in seven years?

Even more detailed questions must be asked if there is to be the most effective remedial work. The analysis should ultimately lead to the exact and detailed conditions productive of high and low achievement and the methods by which low achievement can be made satisfactory. This complete survey lies somewhat beyond the scope of the present effort. We shall present the results in as great detail as our available data and the purpose of this volume warrant. Beyond that we must trust the initiative and interest of Virginia school officers to investigate and to remedy.

A. CITY SCHOOLS (WHITE)

1. *Median Scores.* If we examine the median scores for the city schools of Virginia, we find that they compare favorably (see Tables 1 and 2) with the Thorndike standards and with the scores of city schools in other states.[1]

In grades three, six, and seven the scores for the second

[1] Only the most important tables will be included in the text.

TABLE 1

Reading: Thorndike Scale Alpha 2; 3768 city pupils (white). Grade scores for eight Virginia cities; standard April scores estimated for Virginia schools (seven-year elementary system). Thorndike Standards

8 Virginia cities (April)	4.5	4.9	5.2	5.2	5.8	5.8	6.7	7.2	7.2	7.4
Estimated Virginia Standard (April)	4.7	5.1	5.3	5.6	5.9	6.3	6.7	7.0	7.3	7.6
	L*	H*	L	H	L	H	L	H	L	H
VIRGINIA GRADES	III		IV		V		VI		VII	

STANDARD GRADES	III	IV	V	VI	VII	VIII
Thorndike Standard (mid year)	4.7	5.2	5.7	6.5	7.0	7.5

* L = Low Section, first half year; H = High Section, second half year.

half year not only surpass the Thorndike standard scores, but reach or exceed the scores estimated as indicating normal achievement for Virginia schools.[1] The upper seventh-grade score is practically the standard mid-year score for grade eight (Thorndike standard) under the eight-grade elementary organization. Grade six (second half year) exceeds the Thorndike standard for grade seven and the estimated Virginia norm for grade six by the equivalent of a half year's progress (see Fig. 2).

The upper fourth and fifth grades do not make so good a showing. They do not reach even the mid-semester (April) norm for the first half of these grades. These scores indicate

[1] As shown in Chapter I, each grade in the seven-grade system must accomplish 1½ years' work as measured by the eight-grade system, if the pupils are to enter high school with a preparation equivalent to that obtained from an eight-grade course. The completion of grade three in the Virginia system would mean the equivalent of 3½ years' progress under the eight-grade plan; the end of grade four would mean the accomplishment of 4½ years of work. Accordingly the Thorndike standards derived from tests given to pupils in an eight-grade system were converted into standards for a seven-grade course. Such estimated standards are only approximate.

TABLE 2

Reading: Thorndike Scale Alpha 2. Comparative scores; cities outside of Virginia

Cities	Grades										
	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Date
Thorndike Standard	...	5.2	5.7	6.5	7.0	7.5	7.7	8.0	8.2	8.5	1914
Wisconsin cities	5.1	5.4	5.9	6.8	7.0	7.3	7.2	7.5	7.7	7.7	1918
Indiana cities (scale A)	5.5	6.6	7.6	8.5	8.7	9.0	...	...	...	....	1914
St. Paul, Minnesota	5.2	5.6	5.7	6.7	7.2	7.8	...	...	...	....	1917
Paterson, New Jersey	...	4.8	5.4	6.4	6.6	6.9	...	...	...	....	1918
San Francisco, California	4.9	5.6	6.6	6.5	7.4	7.8	...	...	...	....	1916
Louisville, Kentucky	...	5.3	5.7	6.6	7.6	7.7	...	...	...	....	1916
Private School, New York City	4.3	5.5	6.3	6.5	8.0	7.7	...	...	...	....	1917
Mt. Holly, New Jersey	...	5.5	5.3	6.9	7.4	7.3	7.0	7.5	7.5	7.8	1918
Republic, Michigan	3.2	5.1	5.6	5.9	7.1	7.6	7.4	7.6	8.2	8.5	1918
Woodmere, New York	...	5.6	5.7	6.8	7.6	7.7	8.1	...	...	....	1919
Friends School, Brooklyn	...	5.3	5.8	7.0	7.5	7.8	8.2	8.3	8.4	8.7	1919
Boyce, Louisiana	4.3	5.4	5.8	7.0	....	.....	...	...	...	....	1919
Sutherland, Iowa	...	5.4	6.0	6.7	7.2	7.2	...	...	...	....	1918
Horace Mann School, New York City	...	5.6	6.4	6.0	8.0	7.7	...	...	...	....	.....

the weak places in an otherwise excellent showing for the city schools.

2. *Comparison with Cities outside the State.* If we compare the average grade scores for Virginia cities with those for thirty-four Wisconsin cities (see Table 2), the comparison is favorable to the former in grades three, six, and seven, judged on the basis of both the grade scores and median ages. The Thorndike mid-year standard for grade eight is 7.5. The pupils in grade seven, Virginia cities, score 7.4; the Wisconsin pupils, grade eight, make a score of 7.3. Both groups are completing the elementary course, the Virginia group with a median age of 13.7 years (see Table 5), the Wisconsin children aged 14. It is probable that the largest percentage of children in both systems enter school at six years or earlier, and judged by the national standard (Part 1, Table 21), the pupils of both states are one year overage at completion of the

TABLE 3

Reading: Thorndike Scale Alpha 2; 3768 city pupils (white). Scores by grades and half-grades for eight Virginia cities; average grade scores and Thorndike Standards and estimated Virginia Standards for mid-year (April)

Cities	Scores									
Charlottesville	4.2	5.0	5.0	5.0	4.6	4.8	6.4	7.5	7.0	7.2
Lynchburg	5.1	5.2	5.7	5.4	5.8	5.6	6.7	7.0	7.3	7.0
Newport News	4.4	5.5	5.0	4.9	...	...	6.8	...	7.5	7.6
Portsmouth	4.8	...	5.2	4.9	5.8	5.8	7.1	7.1	7.4	7.4
Richmond	4.3	5.1	5.7	5.4	5.8	5.9	6.4	6.9	6.9	7.6
Roanoke	...	4.7	5.5	5.3	7.0	6.8	6.7	7.0	7.0	7.6
Average score	4.5	4.9	5.2	5.2	5.8	5.8	6.7	7.2	7.2	7.4
Radford	4.4		4.9		6.1		6.7		7.3	
Estimated standard, half year (April)	4.8	5.0	5.3	5.6	5.9	6.2	6.7	7.0	7.2	7.6
	L*	H*	L	H	L	H	L	H	L	H
Virginia Grades	III		IV		V		VI		VII	

Standard Grades	III	IV	V	VI	VII	VIII
Thorndike Standard, mid-year, 8-grade system	4.7	5.2	5.7	6.5	7	7.5

Norfolk	4.4	4.7	4.5	5.2	5.7	5.5	7.0	7.6	7.0	7.4	8.0	8.1

* L = first half year; H = second half year.

elementary course. The Virginia city sixth-grade pupils are approximately the same age as the Wisconsin grade seven, and they almost attain the score made by Wisconsin grade eight.

A study of the individual city scores shown in Tables 2 and 3 indicates a wide range of achievement in the schools of approximately a hundred school systems represented in these

two tables. In no grade are the average Virginia scores as low and in no grade are they as high as are some of the scores reported from other cities. In grade four, for example, the average Virginia score for each half grade is 5.2. This score is exceeded by the fourth grades of most of the cities outside of Virginia, but no Virginia city scores as low as Paterson, New Jersey, or Republic, Michigan, and both Lynchburg and Richmond [1] show scores higher than any of the outside cities except those of Indiana. In grade seven the Virginia average is 7.2 and 7.4 for the two half years, but this score is exceeded by the schools of Indiana, St. Paul, San Francisco, Louisville, and several other cities. These average Virginia scores, however, are higher than those of Paterson, Sutherland, and Mt. Holly, and several Virginia cities score relatively high, Norfolk [2] showing higher scores for grade eight than any city outside of Virginia except those of Indiana.

3. *Progress from Grade to Grade.* Every city shows progress in reading from grade three through the seventh grade. The total increase in average scores amounts to 2.9 scale units, which is approximately normal, an average increase per year of a little over one-half scale unit. Progress is slightly below normal for grades four and five, but grade six, first half, attains a standard score, and the upper sixth exceeds the April norm by almost a semester's development. The progress indicated for the first half year of each grade is normal in total amount and consistent from grade to grade. With the exception of lower grade three, the high average scores for the lower half of each grade, combined with the regular increase, make a decidedly satisfactory showing for the first-half-year classes. The showing for second-half-year classes is less satisfactory.

4. *Age and Reading Progress.* From an examination of the median age (Table 5) for the seven cities it is evident that the median age of the pupils who were tested in reading is in every grade normal according to the Virginia age standard, based on an entrance age of seven years, but one year higher

[1] The Thorndike scale had been previously used in the Richmond schools.

[2] Norfolk has an eight-grade elementary school system.

than it should be according to the national standard, based on entrance at six years. In both cases a one-year span is considered normal.

5. *Results Based on Number of Questions Answered.* On the basis of the median number of questions answered correctly on the entire test as shown in Table 16, Virginia city pupils make a better showing than do the children in either thirteen Wisconsin cities or thirty-four Wisconsin cities. For grade six the median number of questions correct on the entire test is two more than the median number for the Wisconsin seventh grade, and the upper seventh grade has a score of 15.1 in comparison with the score of 12.9 for the eighth grade in thirteen Wisconsin cities, and 14 for the entire grade in thirty-four Wisconsin cities.

6. *Summary.* Comparison of the Virginia records with the Thorndike standards and with the scores for Wisconsin and other cities leads to the conclusion that in general the city schools of Virginia succeed in teaching children to read by the time they complete the elementary course — succeed as well as do thirty-four Wisconsin cities or the schools from which Thorndike derived his standards. How clearly each of the cities succeeds in teaching all its pupils so that they make normal progress in reading will be shown later in the analysis of results for the various schools and grades in the individual cities.

B. RURAL SCHOOLS (WHITE)

The children who attend the rural white schools of Virginia are not learning to read as they should. As a group the 3038 rural pupils whose scores are shown in Table 4 are from two to two and a half years behind the pupils in the city schools. Grade seven, for example, scores slightly lower than the city sixth grades, although the pupils are about one and a half years older than the city seventh-graders or two and a half years older than the city sixth-graders. Rural fourth-grade children are almost twelve years old, but they read less well than the city third-graders, whose median age is nine and a half years. Similar comparisons for the other grades show

TABLE 4

Reading: Thorndike Scale Alpha 2; 3038 non-city pupils (white). Average grade scores for one-, two-, three-, and four- (or more) teacher schools in the following counties: Albemarle, Appomattox, Caroline, Carrol, Charlotte, Giles, Henrico, Isle of Wight, Lancaster, Loudoun, Northampton, Rockbridge, Rockingham, Smyth, Stafford, and Wise. Also city scores and Thorndike standard

Type of School	Median Scores					Total Number Pupils
One-teacher	3.9	4.3	5.4	6.3	—	186
Two-teacher	4.3	4.7	5.3	6.3	6.7	298
Three-teacher	3.7	4.9	5.4	5.8	6.2	285
Four-teacher	4.4	4.9	5.6	6.4	6.9	2259
Average score (non-city schools)	4.1	4.7	5.4	6.2	6.6	3038
City average (first half)	4.5	5.2	5.8	6.7	7.2	3768
City average (second half)	4.9	5.2	5.8	7.2	7.4	3768
VIRGINIA GRADES	III	IV	V	VI	VII	.....

STANDARD GRADES	III	IV	V	VI	VII	VIII	.....
Thorndike Standard (mid-year)	4.7*	5.2	5.7	6.5	7.0	7.5	.....

* Estimated.

like conditions. The average rural child is, therefore, from one to two or more years behind where he should be for his age.

One-teacher, Two-teacher, Three-teacher, and Four-teacher Schools. A study of the records of the rural schools of the several types shows that there is little difference in the test results for the one-, two-, and three-teacher schools (Table 4). The three-teacher schools show even lower scores in grades three and six than do the other two. The pupils in grade six in the three-room schools just attain the Thorndike standard for grade five, and in the one- and two-room schools the sixth grade makes a score somewhat above the estimated standard for grade five of Virginia schools having the seven-

TABLE 5

Median ages of 3038 pupils in rural white schools, included in reading test, Thorndike Scale Alpha 2

Type of School	III	IV	V	VI	VII
One-teacher	10.8	12.2	13.5	14.0	14.9
Two-teacher	11.5	12.4	13.0	14.2	16.0
Three-teacher	11.0	12.0	13.0	14.1	15.0
Four-teacher (or more)	10.4	11.2	12.2	13.1	14.0
Median all-rural schools	10.9	11.9	12.9	13.8	15.0
Median city (second half year)	9.5	10.7	11.5	12.6	13.7
Virginia Standard (entrance age at seven) (mid-year)	9.5	10.5	11.5	12.5	13.5

grade elementary course. In every grade the median age of the pupils (Table 5) is from two to two and one half years above the Virginia standard age, considering age at entrance to school as seven years. Thus, half of the pupils in grade three, who are eleven years old, have much less than third-grade reading ability on the basis of this test, when normally they should be reading fifth or sixth grade material; their actual retardation in reading is three years or more. This handicap in grade three is not overcome either by those who leave school after grade five or by those who remain through grade seven.

According to the records of elimination shown in Part 1 of the survey report (page 84) pupils in the non-city schools begin to drop out in grades four and five, and by the end of grade six one third have left school. It is evident from Table 4 that the pupils who leave school in these grades are equipped with far less ability in reading than they should have for successful work in adult life.

The four-teacher schools[1] make a somewhat better showing than do the other rural schools. Grade for grade the pupils are younger than those in the other non-city schools by about one chronological year. Grade for grade they score equal to or better than the pupils in the one-, two-, or three-teacher

[1] These include some town and village schools which by legal definition are "non-city" schools. Such schools are not rural.

schools. They are thus about one year in advance of the pupils in the smaller rural schools. However, in comparison with the city schools, even these four-teacher schools make a poor showing. The pupils in the four-teacher schools are about eight months older than the city pupils of the corresponding grades and are poorer readers by about one half of a scale step or the equivalent of one year of normal reading progress. Considering both age and scores, the four-teacher schools, therefore, which are about one year in advance of the smaller rural schools, are still one and one half years behind the median city school.

Age and Reading Progress. From the foregoing discussion it is apparent that grade scores may be misleading as a basis of comparison with the city scores, and that the ages of the pupils must be considered in interpreting such scores. When one examines the ages of the individuals composing any particular group, as a class in a one-room school, the uncertain character of mere grade scores becomes even more obvious. In any such class composed of ten or more pupils the range of chronological ages may be seven to eight years. One hundred pupils in grade three in the one-room schools show an age range of from seven to fourteen years. In grade four are children eight years old and some fifteen years of age. Ages twelve, thirteen, and fourteen are represented in every grade from three through seven in an almost indiscriminate way.

That the chronological age and maturity of these pupils bear little relation to their reading skill is evident from the fact that the pupils aged thirteen years in grade three make approximately the same score as those eight years old. In this grade only the eleven-year-old group, comprising fifteen per cent of the pupils included in the grade, reaches the standard third-grade score. The fourteen-year-old children make a score about one half year below the third-grade norm. Whether these pupils entered school abnormally late, whether they are inferior in native capacity, or whether their whole shortcoming is chargeable to bad school conditions cannot be determined in this particular instance for the purpose of this report. What is clear is that it behooves those who are

TABLE 6

Reading: Thorndike Scale Alpha 2; 1029 city pupils (colored). City grade scores and average grade scores; also average grade scores for white schools; Thorndike standard scores and estimated standard for Virginia schools (mid-year)

Cities	Grades									
Charlottesville	...	4.1	...	4.7	...	5.5	...	7.2	...	7.1
Lynchburg	4.2	3.8	5.5	5.8	4.6	5.6	6.1	6.1	...	6.8
Newport News	...	...	...	6.0	...	4.6	...	6.6	...	7.2
Richmond	...	4.3	4.9	4.9	5.0	6.0	...	6.5	6.8	7.1
Roanoke	4.5	3.1	5.0	3.8	5.1	5.6	6.9	7.1	...	7.8
City average, colored	3.8	3.8	5.3	5.0	5.1	5.4	6.6	6.7	6.8	7.2
City average, white	4.5	4.9	5.2	5.2	5.8	5.8	6.7	7.2	7.2	7.4
Virginia schools estimated standard (mid-year)	4.9		5.5		6.1		6.9		7.5	
	L*	H*	L	H	L	H	L	H	L	H
VIRGINIA GRADES	III		IV		V		VI		VII	
STANDARD GRADES	III		IV		V		VI		VII	VIII
Thorndike Standard (mid-year)	4.7 †		5.2		5.7		6.5		7.0	7.5
Norfolk	3.3	3.7	5.8	4.9	5.6	5.3	6.7	...	6.9	...	...	...

* L = first half year; H = second half year
† Estimated.

responsible for this condition to study the facts and to improve conditions.

C. CITY SCHOOLS (COLORED)

How well are the colored boys and girls learning to read? If grade scores (Table 6) only be considered, the colored schools in Virginia cities would appear to achieve almost as satisfactory results in reading as do the white schools. A comparison of the average scores for the white and colored

city schools in the Thorndike reading test shows that on the average the latter fall short of the average white achievement but little less than .4 scale steps. This is less than a year of normal school progress. It would appear, therefore, that the white schools, grade for grade, are not more than one year in advance of the colored schools. In fact, in the lower fourth grade the colored city average is slightly better than the average for white schools. In the upper seventh grade the colored school is only .2 scale step short of the white school achievement. The poorest work in the colored schools appears in grade three, which falls considerably more than a year behind the average white third grade, and this poor third-grade achievement characterizes practically every city.

An examination of the ages of the colored children, however, indicates a much less satisfactory condition. The average age for the seventh-grade children in the white schools is thirteen and one half years; the colored children in the same grade are a full year older. They are, therefore, practically one year and a half behind the white children in actual achievement. In the three cities for which comparative age records are available, the colored pupils finish the elementary school at the age of fourteen and one half and fifteen years, with a grade score in reading about one half year below the standard. In the lower grades eighty per cent of the grade scores show a reading ability one to one and one half years below the scores for the white schools.

The scores for the colored schools show most irregular progress. For four of the cities, the word *progress* cannot accurately be used to characterize the reading conditions which are revealed. For example, grade four has a score of 6, indicating reading ability normal for grade five, while grade five reads less well than the third grade should read. In Norfolk the lower fourth makes a score normal for grade five (first half), and the grade four (second half) makes the standard score for grade three. Similar illustrations could be selected from any one of the city records.

An examination of the records for several individual classes verifies the story told by the grade scores of low achievement — irregular progress and extreme variation in the accom-

TABLE 7

Reading: Thorndike Scale Alpha 2; 1029 city pupils (colored). Median number of questions correct on entire test, by half grades. Six Virginia cities. Comparative scores for city white schools and for thirty-four Wisconsin cities

Cities	Scores									
Charlottesville	....	7.3	....	14.1	....	16.2	....	12.0	....	13.4
Lynchburg	9.5	9.9	13.7	14.5	14.0	16.5	....	....	....	....
Newport News	....	....	10.8	....	....	9.5	....	9.4	12.9	....
Richmond	....	6.2	9.8	11.4	12.1	14.6	9.0	10.2	13.3	12.3
Roanoke	7.5	4.0	12.0	11.5	....	19.3	12.1	11.0	....	....
Median	8.2	7.1	11.3	13.4	12.9	15.3	8.9	10.7	12.1	12.5
Median white schools	8.0	9.4	12.8	13.0	16.5	17.2	10.5	13.0	14.6	15.1
	L*	H*	L	H	L	H	L	H	L	H
VIRGINIA GRADES	III		IV		V		VI		VII	
STANDARD GRADES	III		IV		V		VI		VII	VIII
34 Wisconsin cities (white)	10.5		12.9		16.7		10.5		12.4	14.0
Norfolk	7.5	10.4	15.5	12.6	15.5	5.0	10.8	11.8	....	....	....	....

* L = first half year; H = second half year.

plishment both of entire classes and of individuals. The range in chronological age in almost every class is from six to nine years.

According to the statement made in Chapter IV, Part 1, relative to stay in school, colored children in the rural schools begin to leave school when they are in grade four. By the time the seventh grade is reached, but one fifth are left in the rural schools and two fifths in the city schools. It would seem, therefore, that of the colored children who enter school the largest numbers leave with ability to read

TABLE 8

Reading: Thorndike Scale Alpha 2; 1000 rural pupils (colored). Grade scores and average scores arranged by one-, two-, three-, and four- (or more) teacher schools. Comparative scores for 3088 white pupils in rural schools and for city schools, white and colored*

Virginia Grades.....	III	IV	V	VI	VII
One-teacher.....	3.2	4.6	4.9	6.1	6.0
Two-teacher.....	4.2	5.0	5.7	6.7	7.1
Three-teacher.....	4.3	5.3	5.7	6.9	7.3
Four-teacher.....	4.5	5.7	5.9	6.4	6.7
Average, colored rural schools .	4.0	5.1	5.5	6.5	6.8
Average, white rural schools...	4.1	4.7	5.4	6.2	6.6
Average, city colored schools..	3.8	5.0	5.4	6.6	7.2
Average, city white schools....	4.9	5.2	5.8	7.2	7.4

* The rural colored schools represent the following counties: Albemarle, Appomattox, Caroline, Charlotte, Isle of Wight, Lancaster, Loudoun, Northampton, Rockbridge.

material no more difficult than is the second set of paragraphs (difficulty 5.25) in the Thorndike Scale Alpha 2, which is the Thorndike standard for grade four. (Score for fifth-grade colored city schools 5.0; rural schools 5.1.)

Median Number of Questions Correct. As in the case of the white pupils the record of the median number of questions correct (Table 7) indicates some progress for certain grades which, judged by the grade score, appeared inferior in reading ability to classes below them in grade location. However, the successive grade medians in Table 7 also show inequality of achievement for a given grade in the several cities and inferior performance for the second-half-year classes in comparison with the first-half-year pupils.

D. RURAL SCHOOLS (COLORED)

An examination of the results in the rural schools (Table 8) apparently shows that only in the one-room schools do the colored pupils read less well grade for grade than do the white children in similar schools. In the two-teacher, three-teacher, and four-teacher schools they read with greater ability than do the white pupils, and in grades three, four,

TABLE 9

Reading: median ages, 1000 pupils (colored). Comparative ages white rural schools; also for three city systems, colored

Type of Schools	Grades				
	III	IV	V	VI	VII
One-teacher	11.0	13.0	13.0	16.0	15.0
Two-teacher	11.0	12.0	13.5	14.6	15.0
Three-teacher	11.0	12.4	13.3	15.0	14.6
Four-teacher (or more)	11.0	12.5	13.8	14.0	14.6
Median all-rural (colored)	11.0	12.5	13.5	14.8	14.9
Median all-rural (white)	10.9	11.9	12.9	13.8	15.0
Median city schools (colored)	10.0	12.0	12.5	13.5	14.0

and five of these schools they exceed the average grade score for the colored schools in the cities. The average score for all colored pupils is from one half to one year below the estimated standard for Virginia schools.

This showing seems high in view of the conditions in the colored rural schools until, as in the case of the rural white schools, it is observed (Table 9) that the colored pupils are two to four years overage as judged by the national age standard, and one and one half to three years above normal age as determined by the Virginia standard.

When grade score and median age are considered in relation to each other, it is seen that the fifth grade in the colored rural school, which makes an average score of 5.5 and reads with fourth-grade skill, should in reality attain a score of 7.5, indicative of seventh-grade achievement. The pupils in the three-teacher schools, grade four, make a score of 5.3 and seem to be making normal progress in learning to read silently until it is noted that they are more than twelve years of age, normally should be in grade six (Virginia standard), and should read sufficiently well to score 6.9 on the Thorndike scale. In view of the median ages of the rural colored schools, therefore, their achievement in reading skill is pitiably low.

E. ANALYSIS OF CITY RECORDS

Variations of Grade Scores. The average median grade score for all cities indicates, as has been stated, a satisfactory showing in reading for Virginia city schools; but that this satisfactory condition is not found in every city is clearly evident from a study of the scores in Table 2. Not only do several cities show low scores for the city as a whole in one or more grades, but there is insufficient and irregular progress, especially in the intermediate grades. In certain cities a combination of low scores and irregular progress for one or more individual schools indicates decidedly poor school product.

The average seventh-grader in five of the eight cities reads as well as or better than is expected of a pupil who is completing the work of the elementary schools. Of the three cities which fail to measure up to the standard score in upper grade seven, Lynchburg is the only one in which the score is a full grade below the norm. Norfolk with her eight-grade system has a uniformly excellent record with the exception of that for the upper fifth grade. Every city except one makes a decidedly strong showing in grade six. Radford's score of 6.7 is probably lowered by the inclusion of the first-half-year pupils with the upper section. The records do not show upper and lower half years separately for this city.

On the other hand, the low average score for the upper fifth grade is characteristic of every city except two, while four cities show a fourth-grade score (second half) no higher than that made by the third grade; no city score for the fourth grade reaches the standard estimated for that grade. The weakness of these two half years, which was commented upon in the discussion of the general average, is difficult to account for, since the present upper third grade read very well in four of six cities and the first-half-year classes in grades four and five reach the estimated standard except in two cities.

Table 10 emphasizes how scores for the same grade differ for the several cities. The difference in reading ability for the same grade in the eight cities ranges from .6 to 2.4 scale units. In other words, the difference between the skill attained

TABLE 10

Reading: Thorndike Scale Alpha 2. Average and extreme grade scores for eight Virginia cities, also standard scores

	III		IV		V		VI		VII		VIII
	L	H	L	H	L	H	L	H	L	H	
Highest	5.1	5.5	5.7	5.7	7.0	6.8	7.0	7.6	7.5	7.6	.....
Average of 8 cities	4.5	4.9	5.2	5.2	5.8	5.8	6.7	7.2	7.2	7.4	.....
Lowest	4.2	4.4	4.5	4.9	4.6	4.8	6.4	6.7	6.9	7.0	.....
Thorndike Standard (mid-year)	4.7		5.2		5.7		6.5		7.0		7.5
Estimated standard Virginia schools (mid-year)	4.9		5.5		6.1		6.9		7.5		.....
Difference in scale steps between highest and lowest scores	0.9	1.1	1.2	0.8	2.4	2.0	0.6	0.9	0.6	0.6	.....

NOTE. Estimated normal progress for one year for Virginia system (seven-year elementary course) is .6 scale unit.

by a given grade in one city and the reading ability acquired by that grade in other cities is the equivalent of normal progress for from one to four years. It is only fair to point out that this wide range is due as frequently to the highest scores being the equivalent of from one half to two years' progress above the grade standard as to the fact that the lowest scores are equally below the expected accomplishment.

Charlottesville may well endeavor to discover the conditions which give her lowest ranks in four times of a possible ten and result in such erratic progress as is indicated for her work throughout the course. Her present fifth grade shows a score no higher than the third grade should make and, in fact, a record lower than the third grade does make. The fourth grade also suffers decidedly by comparison either with the work of the upper third grade or with the standard.

In Newport News grade four in general reads less well than the third grade. A study of the variations in reading

TABLE 11

Reading: Thorndike Scale Alpha 2. Low and high class scores in single cities

City	Grade	Low Score	High Score
Norfolk*.....	3H	3.9	5.2
	4L	4.9	5.3
	4H	4.7	5.5
	5H	5.4	6.8
	6H	6.8	7.5
	7H	6.2	8.6
Roanoke.....	3L	4.0 (Jameson School)	5.4 (Park)
	4H	4.7 (West End)	6.2 (Melrose)
Portsmouth.....	7L	6.8 (Cook Street)	7.6 (Elm Street)
	7H	7.2 (Cook Street)	7.8 (Elm Street)

* The Walter Taylor and Robert E. Lee schools of Norfolk are conspicuous for their superior scores.

achievement of the several schools within the city indicates that it is the record of the Magruder School which reduces the city grade score; the John Daniel and Jefferson schools make scores in grades three and four which are normal for grade six. On the basis of grade scores for the entire city Portsmouth's record shows distinct weakness only in the upper fourth and upper fifth grades. Judged by the number of times the second half year of each grade reaches or exceeds the estimated standard, Radford has the poorest record of the eight cities, but it must be remembered that Radford's score represented the first half year's work in combination with the second half year and so cannot with fairness be compared with the standards for the second half year of each grade. However, beginning reading would seem to be less well taught in Radford during the past two years than formerly if the evidence of the grammar-grade scores in contrast with the decidedly low third and fourth grade scores is to be believed.

The combined grade score for the large number of individual classes in Richmond[1] shows excellent understanding

[1] The Thorndike scale had been previously used in the Richmond schools, a fact which should be considered in connection with the Richmond scores.

TABLE 12

Silent Reading: Thorndike Scale Alpha 2, showing number of children making the score of each particular grade in four classes in the Ginter Park School of Richmond

Ability of Pupils	Number of Pupils			
	Fourth Grade		Fifth Grade	
	1st Half	2d Half	1st Half	2d Half
Below grade 3	8	3	1	.....
Grade 3	2	3	2	1
Grade 4	7	8	3	5
Grade 5	2	2	3	3
Grade 6	1	.....	1	12
Grade 7	.....	.....	.....	2

of material read. In Norfolk the grade scores for the entire city show that pupils in grade six read with an understanding exceeding the expectation for grade eight, and in Roanoke pupils in grade five reach the score normal for grade six. In Lynchburg and Roanoke there exists a median overageness of from one to two years in several grades, combined sometimes with a score in reading at least a half year below standard. In Roanoke the grade six score is a year above standard.

Norfolk makes the best record of the eight cities, on the basis of the fact that she has the highest score oftener than any other city, and that her second-half-ear classes equal or exceed the standard scores in five out of six grades.

Intra-city Variation of Grade Scores. In Richmond one upper-third-grade class scores 4.4 (less than lower-third-grade standard) and has a median score of 6.4 questions answered correctly; a second upper-third-grade class scores 5.8 with a median score of eleven questions correct, while a third class of the same grade can read material of difficulty 6.1 (upper-fifth-grade standard) and has a median of eleven questions correct. Three fourth-grade classes selected at random have scores of 3.7, 5.6, and 5.9, respectively. The average low-seventh-grade pupil in the Robert Fulton School

TABLE 13

Silent Reading: Thorndike Scale Alpha 2. Average grade scores for several Virginia groups and for 9398 pupils in thirty-four Wisconsin cities

Groups	III	IV	V	VI	VII	VIII
186 white pupils in one-teacher schools	3.9	4.3	5.4	6.3	.....	.....
2259 white pupils in four-teacher non-city schools	4.4	4.9	5.6	6.4	6.9	.....
3038 white pupils in city schools (second half year)	4.9	5.2	5.8	7.2	7.4	.....
34 Wisconsin cities	5.1	5.4	5.9	6.8	7.0	7.3
245 colored pupils in one-teacher rural schools	3.2	4.6	4.9	6.1	6.0	.....
1029 colored pupils in city schools (second half year)	3.8	5.0	5.4	6.6	7.2	.....
319 colored pupils in four-teacher rural schools	4.5	5.7	5.9	6.4	6.7	.....

is completing the course with sixth-grade reading ability (score 6.5), while the pupils in Ginter Park have a score of 7.9. The Magruder School in Newport News is obviously responsible for the low fourth-grade score of 4.9 (third-grade norm); John Daniel and Jefferson schools average 6.3 (upper-fifth standard). The Magruder School scores 4.1 and 4.7 in the lower and upper third in contrast to the John Daniel record of 5.5 and 6.4.

. The classes in each grade in the different cities are completing the same work, and yet the difference between the ability indicated by the low score and that evidenced by the high score in the same city often is equivalent to normal progress for two full years. An additional fact of interest is that the pupils in Norfolk who make the highest scores are grade for grade a year younger than the pupils in the other seven cities.

Not only do certain schools in each city obtain superior results in one or more grades, but these schools usually show consistent progress from grade to grade. Some of the poorer schools make uniformly low records throughout the elementary course, while for others the scores indicate exceedingly erratic progress.

TABLE 14

Silent Reading: Thorndike Scale Alpha 2. Median age of pupils in seven cities. Comparative age records for thirteen Wisconsin cities†*

Cities	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
	L	H	L	H	L	H	L	H	L	H	L	H
Lynchburg..	9.8	....	10.6	11.0	11.5	12.8	13.0	12.8	14.0	14.1	....	....
Newport News.....	9.9	9.9	10.5	11.2	....	....	12.5	....	13.9	13.9	....	....
Norfolk.....	9.0	9.0	10.0	10.4	10.8	11.2	11.5	11.7	13.4	13.2	14.0	13.9
Portsmouth.	....	9.3	10.3	10.1	11.5	11.5	12.4	12.7	13.5	14.5	....	....
Radford ‡...	10.1		10.6		11.7		13.1		13.6		....	....
Richmond..	9.4	9.8	10.4	10.7	11.2	11.6	12.3	12.7	13.7	13.5	....	....
Roanoke....	10.1	9.6	11.1	10.9	12.0	12.3	....	....	14.4	....	....	....
Median.....	9.4	9.5	10.4	10.7	11.1	11.5	12.4	12.6	13.6	13.7	....	....
13 Wisconsin cities.....	9.0		10.0		11.0		12.0		13.0		14.0	

* No age reports for Charlottesville.

† Wisconsin medians are only crude medians; Virginia medians are exact medians.

In determining Wisconsin record age 9, e.g., means 9 years to 10 years; in the Virginia estimate age 9 includes 8 years 10 months to 9 years 3 months; age 9.5 means 9 years 4 months to 9 years 10 months.

‡ A and B classes not reported separately.

F. ANALYSIS OF CLASS AND INDIVIDUAL RECORDS

Individual Classes. In grade 4A of the Ginter Park School of Richmond the range of chronological age is eleven half years. The oldest pupil, age thirteen years, six months, makes a score less than third-grade achievement; another pupil making this same achievement is only eight years old. A second eight-year-old pupil reads with sixth-grade ability. This latter pupil has a mental age of thirteen years, eight months, with an intelligence quotient of 156, and her reading ability is three years beyond that which is normal for her chronological age. This same class contains four pupils, each of approximately ten years, six months, who score as follows: 3.6, 3.6, 6.1, 6.3, a range from third- to fifth-grade

TABLE 15

Silent Reading: Thorndike Scale Alpha 2; eight Virginia cities. Grade scores and averages, half grades; median ages by half grades. Thorndike standard scores and estimated standard scores for Virginia schools (mid year and April)

Cities	Scores									
Charlottesville										
Score	4.5	5.0	5.0	5.0	4.6	4.8	6.4	7.5	7.0	7.2
Median age	....	....	....	....	....	....	....	....	....	....
Lynchburg										
Score	5.1	5.2	5.7	5.4	5.8	5.6	6.7	7.0	7.3	7.0
Median age	9.8	....	10.6	11.0	11.5	12.8	13.0	12.8	14.0	14.1
Newport News										
Score	4.4	5.5	5.0	4.9	....	....	6.8	....	7.5	7.6
Median age	....	....	....	....	....	....	12.5	....	13.9	13.9
Radford										
Score	....	4.9	....	4.9	....	6.1	....	6.7	....	7.3
Median age	....	10.1	....	10.6	....	11.7	....	13.1	....	13.6
Portsmouth										
Score	....	4.8	5.3	4.9	5.8	5.9	7.1	7.1	7.4	7.4
Median age	....	9.3	10.3	10.1	11.5	11.5	12.4	12.7	13.5	14.5
Richmond										
Score	4.3	5.1	5.7	5.4	5.8	5.9	6.4	6.9	6.9	7.6
Median age	9.4	9.8	10.4	10.7	11.2	11.6	12.3	12.7	13.7	13.5
Roanoke										
Score	4.7	4.7	5.5	5.3	7.0	6.8	6.7	7.0	7.0	7.6
Median age	10.1	9.6	12.1	10.9	12.0	12.3	....	....	14.4	
Average grade score	4.5	4.9	5.2	5.2	5.8	5.8	6.7	7.2	7.2	7.4
Median age (all cities)	9.4	9.5	10.4	10.7	11.1	11.5	12.4	12.6	13.6	13.7
	L*	H*	L	H	L	H	L	H	L	H
VIRGINIA GRADES	III		IV		V		VI		VII	

STANDARD GRADES	III		IV		V		VI		VII		VIII	
Thorndike standard (mid-year)	4.7		5.2		5.7		6.5		7.0		7.5	
Norfolk	4.4	4.7	4.5	5.2	5.7	5.5	7.0	7.6	7.0	7.4	8.0	8.1
	9.0	9.0	10.0	10.4	10.8	11.2	11.5	11.7	13.4	13.2	14.0	13.9
Estimated Virginia standard city schools, April	4.7		5.1	5.3	5.6	5.9	6.3		6.7	7.0	7.3	7.6

* L = first half year; H = second half year.

TABLE 16

Reading: Thorndike Scale Alpha 2; 2843 city pupils (white). Median score in number of questions correct on entire test. Eight Virginia cities; also median age scores, and comparative scores for thirty-four Wisconsin cities (See also Table 32)

Cities	III		IV		V		VI		VII	
	L	H	L	H	L	H	L	H	L	H
Charlottesville	7.7	11.0	15.5	15.5	15.0	18.6	9.3	11.0	12.2	14.2
Lynchburg	11.5	.....	14.5	15.7	16.2	17.4	10.1	12.6	15.5	15.8
Newport News	11.7	13.8	12.9	11.6	.....	.....	10.9	.....	13.2	14.6
Norfolk	5.7 8.9 10.6		14.0	17.1	17.0	11.2	14.4	12.2 15.0	13.9	18.1
Portsmouth	8.4	.....	10.0	12.9	14.6	18.0	12.2	13.1	14.7	15.7
Radford *	.....	7.0	.....	12.5	.....	14.6	.....	13.8	.....	12.8
Richmond	7.8	9.9	12.7	12.8	16.2	18.0	9.8	11.7	13.0	15.0
Roanoke	9.6	7.1	16.2	13.0	17.4	20.2	.....	.....	18.0	.....
Median	8.0	9.5	12.8	13.0	16.5	17.4	10.5	13.0	14.5	15.1
Median age	9.4	9.6	10.5	10.7	11.7	11.8	12.4	12.6	13.7	13.7

	III	IV	V	VI	VII	VIII
34 Wisconsin cities	10.5	12.9	16.7	10.5	12.4	14.0
Median age	9	10	11	12	13	14

* Pupils in first and second half years not reported separately.

TABLE 17

Silent Reading: Thorndike Scale Alpha 2. Distribution of individual scores, grades 3 to 7, second half year, in four Richmond schools; 400 pupils (white).

	3	4	5	6	7	Total
9.6	....	....	....	....	1	1
8.8	....	....	....	....	2	2
8.6	....	....	....	....	3	3
8.3	....	....	....	....	3	3
8.1	....	....	1	....	1	2
8.0	....	....	....	....	2	2
7.9	....	....	....	....	2	2
7.8	....	....	....	1	....	1
7.7	....	....	....	2	4	6
7.6	....	....	....	2	4	6
7.5	....	....	5	3	5	13
7.4	....	....	....	3	7	10
7.3	....	....	12	6	4	22
7.2	....	....	....	7	....	7
7.1	....	....	....	....	....	.....
7.0	1	....	3	7	4	15
6.9	....	....	2	2	4	8
6.8	....	2	3	10	6	21
6.7	....	....	1	5	6	12
6.6	....	....	10	6	1	17
6.5	....	....	2	3	....	5
6.4	....	....	3	6	3	12
6.3	....	1	2	....	....	3
6.1	1	3	4	4	1	13
6.2	3	1	....	1	....	5
6.0	4	2	6	1	....	13
5.9	1	4	2	3	1	11
5.8	....	1	....	....	....	1
5.7	1	3	4	....	....	8
5.6	2	3	1	....	....	6
5.5	8	10	2	....	....	20
5.4	1	2	....	....	....	3
5.3	1	2	....	....	....	3
5.2	14	10	8	....	....	32
5.1	15	2	5	....	....	22
5.0	6	....	....	....	....	6
4.9	9	4	3	....	....	16
4.8	2	1	....	....	....	3
4.7	....	....	....	....	....	.....
4.6	1	....	....	....	....	1
4.5	14	7	1	....	....	22
4.3	2	3	1	....	....	6
4.1	8	2	....	....	....	10
4.0	1	....	....	....	....	1
3.7	3	....	1	....	....	4
3.6	2	4	....	....	....	6
3.5	....	....	....	....	....	.....
3.3	....	....	....	....	....	.....
3.2	3	....	....	....	....	3
3.1	2	....	....	....	....	2
2.9	3	....	....	....	....	3
2.7	1	....	....	....	....	1
2.6	....	....	1	....	....	1
2.2	2	....	....	....	....	2
0	2	1	....	....	....	3
Total No.	113	68	85	70	64	400
Average	4.8	5.2	6.4	6.8	7.4	.....
Median	5.0	5.3	6.3	6.8	7.3	.....
Estimated Virginia standard (mid-yr.)	4.9	5.5	6.1	6.9	7.5	.....

TABLE 18

Silent Reading: Thorndike Scale, Alpha 2. Distribution of individual scores, grades 3 to 7, in four Richmond schools; 824 pupils (white).

	3	4	5	6	7	Total
9.6	....	....	....	....	1	1
8.8	....	....	....	....	3	3
8.6	....	....	....	....	3	3
8.3	....	....	....	1	3	4
8.1	....	....	1	....	4	5
8.0	....	....	....	....	4	4
7.9	....	....	....	1	3	4
7.8	....	....	....	1	....	1
7.7	....	....	....	3	7	10
7.6	....	....	4	3	6	13
7.5	1	....	6	3	5	15
7.4	....	....	....	3	11	14
7.3	3	....	19	7	8	37
7.2	....	....	12	9	12	33
7.1	....	....	....	2	1	3
7.0	1	....	3	10	6	20
6.9	....	....	2	5	8	15
6.8	....	2	6	17	9	34
6.7	....	....	2	11	11	24
6.6	....	1	12	12	5	30
6.5	....	3	3	9	1	16
6.4	....	1	8	9	7	25
6.3	....	2	2	5	....	9
6.1	2	8	11	9	4	34
6.2	3	1	1	2	4	11
6.0	5	6	13	3	....	27
5.9	1	5	9	5	1	21
5.8	....	6	3	....	....	9
5.7	3	4	4	....	....	11
5.6	2	8	6	....	....	16
5.5	9	16	10	....	....	35
5.4	2	3	3	....	....	8
5.3	2	4	....	....	....	6
5.2	20	18	13	....	....	51
5.1	25	14	11	....	....	50
5.0	7	5	3	....	....	15
4.9	15	17	5	....	....	37
4.8	12	6	4	....	....	22
4.7	....	1	....	....	....	1
4.6	1	....	....	....	....	1
4.5	26	15	4	....	....	45
4.3	3	6	1	....	....	10
4.1	22	5	....	....	....	27
4.0	1	2	....	....	....	3
3.7	7	1	2	....	....	10
3.6	8	10	....	....	....	18
3.5	....	....	....	....	....	.....
3.3	1	....	1	....	....	2
3.2	7	1	....	....	....	8
3.1	2	....	....	....	....	2
2.9	7	1	....	....	....	8
2.7	1	....	....	....	....	1
2.6	....	....	1	....	....	1
2.2	6	....	....	....	....	6
0	4	1	....	....	....	5
Total No.	209	173	185	130	127	824
Average	4.7	5.1	6.2	6.8	7.2	.....
Median	4.8	5.2	6.0	6.8	7.2	.....
Estimated Virginia standard (mid-yr.)	4.9	5.5	6.1	6.9	7.5	.....

TABLE 19

Silent Reading: Thorndike Scale Alpha 2. Range of chronological age in grades four and five by half grades, Ginter Park School, Richmond, and scores made by pupils of each age (Note. 8 years includes ages of 7 years 10 months and 8 years 3 months; 8 years 6 months means ages of 8 years 4 months through 8 years, 9 months)

Age in Years	Number of Pupils	IV–L	Number of Pupils	IV–H	Number of Pupils	V–L	Number of Pupils	V–H
		Scores		Scores		Scores		Scores
8.0	1	4.3	.....	.....	.....	.....	.....	.....
8.5	1	6.4	.....	.....	.....	.....	.....	.....
9.0	5	3.6, 3.6, 4.3, 4.5, 5.2	4	5.6 (2), 6.2 (2)	5	3.3, 5.0, 5.1, 5.9, 6.2	.....	.....
9.5	4	3.6, 5.2, 5.3, 5.9	5	4.5, 4.9, 5.1, 5.5 (2)	1	5.0	.....	.....
10.0	1	5.1	4	4.5, 5.2, 5.3, 5.9	4	5.2, 2.9, 6.0, 6.2	5	5.0, 5.2, 5.9, 6.0, 6.2
10.5	4	3.6, 3.6, 5.1, 6.3	1	3.6	.....	.....	3	5.9, 7.0, 7.5
11.0	.....	.....	1	5.5	2	4.8, 6.4	5	5.2, 6.6, 7.0 (2), 7.3
11.5	1	4.3	1	4.3	1	5.4	5	5.2, 5.7, 6.5, 6.6, 6.9
12.0	.....	.....	1	3.6	.....	.....	2	5.5, 7.0
12.5	1	5.5	.....	.....	.....	.....	3	5.7, 6.3, 6.8
13.0	1	5.5	.....	.....	1	4.8	2	5.2, 6.6
13.5	1	5.0	.....	.....	.....	.....	.....	.....
14.0	.....	.....	.....	.....	.....	.....	1	5.6
14.5	.....	.....	.....	.....	.....	.....	1	6.6
15.0	.....	.....	.....	.....	.....	.....	1	6.5
Median age	.....	9.5	.....	10.0	.....	10.0	.....	11.5
Median score	.....	5.1	.....	5.3	.....	5.3	.....	6.5
Average score	.....	4.8	.....	5.1	.....	5.2	.....	6.2

achievement. This situation can be substantially duplicated in other classes in the Ginter Park School, in the Ruffner School, and in any other school in Richmond or in any other city in Virginia. A summary from the detailed tables shows that on a basis of scores in silent reading, the seventy pupils in grades 4A to 5B in the Ginter Park School distribute themselves as shown in Table 12.

Examination of Larger Groups. How general this condition is, is evident from the combined distribution of individual scores from 824 pupils in four schools,[1] grades three to seven, shown in Tables 17 and 18, and from the age-grade-achievement records.

In grades three, four, and five (Tables 17 and 18) are pupils who cannot read the first paragraph in the Thorndike Scale Alpha 2, which is much less skill than is expected of normal third-grade children. Others read as well as is expected of pupils completing the elementary school course.

Sixteen per cent of grade 3B (upper third) cannot read material as difficult as paragraph one of the Scale Alpha 2; 12.4 per cent can read material of standard difficulty of grade four or better, while 5 per cent can read the paragraphs of fifth-grade difficulty (Thorndike's standards).

Twenty-five per cent of grade four have less than standard ability for grade three, while nine per cent read as well as or better than standard achievement for fifth grade. It is obvious that if assignments and methods in teaching geography, history, and other subjects are suited to the thirty per cent of grade five who possess standard sixth-grade skill or more, equally satisfactory results are impossible for the twenty-seven per cent who cannot read with the understanding normal for fourth-grade pupils.

As is to be expected, grades six and seven show less variability than exists in the lower grades. Elimination of pupils in Virginia schools (as elsewhere) occurs in increasing degree after grade five, and those first to leave school are the over-

[1] Returns for all grades from three through seven were not complete for the four schools, selected as representing typical conditions for the study of intra-grade variation. As a result other schools had to be substituted in certain grades. In grades 3A and 3B are included scores from Ginter Park, William Fox, Fairmount, and Ruffner schools. In grades 4A and 4B Grace Arents was substituted for Ruffner, while in grade 6 Robert Fulton is included instead of Ruffner.

age and retarded pupils. This may explain in part the fact that in grades six and seven of the four Richmond schools there are enrolled only twenty-five pupils who are below grade 5B (upper fifth) in reading ability, and that in grade seven, twenty per cent of the pupils possess the reading ability of high-school pupils. Nine per cent make a score greatly in excess of the standard score for high-school fourth-year pupils.

Individual Ages and Progress in Reading. A study of the distribution of pupils of a given age through successive grades, together with the average scores with each age group, will help to answer the question whether children in these grades do make normal progress in reading. Taking 119 eleven-year-old pupils in a single school system, one finds that they score slightly above the fifth-grade ability. If we assume that these pupils entered school at the age of seven years, progress in learning to read would appear normal, since they make approximately the mid-year standard for grade five in Virginia schools. If, however, we assume that these children entered school at the age of six years, then only 21.9 per cent have made normal progress, since they should be in the sixth grade with sixth-grade reading capacity. As a matter of fact, 38.7 per cent of these pupils are in grades three and four, and practically none of this retarded group shows reading capacity above what should be normal for the first half of grade four.

Is increase in age followed by increased reading capacity? An examination of tables which give distribution of individual scores and grade location for these 119 eleven-year-olds would indicate that it is those pupils who are normal for their grade and those who are under age that make the grade score. Of this eleven-year-old group 38.7 per cent are in grades three and four who are not only retarded in grade progress one to three years, according to the age of entrance, but who are equally retarded in reading skill. The grade scores would, therefore, seem to be kept up by those pupils who make either a normal or rapid progress through the grades. For example, the pupils ten years, six months who are in the low fifth grade average 6.1, which is the mid-year standard for grade six. Children of the same age in the lower sixth grade score

7.2, which is normal for lower seventh grade. Children of this age in the third grade, however, score actually below the third-grade standard of reading achievement.

G. SUMMARY

1. The study of the records of the individual cities supports the evidence of the all-city average, that the work in reading for Virginia cities is strong in grades six and seven; that it is satisfactory for the third grade; but that the work of the fourth and fifth grades in the second half in four of the eight cities is less commendable, though not discouragingly poor except in two cities. With the exception of grades four and five (second half), the records in silent reading for the Virginia cities compare favorably with the achievement of cities elsewhere as measured by the Thorndike Scale Alpha 2.

2. The favorable criticism of the work of the sixth and seventh grades must be modified in part by the fact that, though the city schools do succeed in teaching silent reading in seven grades, not all do so in seven years. The median age for three cities indicates that at least half of the pupils in grade seven in 1918–19 had been in school eight years or more. In two of these cities the problem of age and progress of pupils demands serious attention. Assuming an entrance age of seven years (Virginia standard), three cities, Richmond, Radford, and Newport News, show a median age score for grade seven, second half, indicating normal progress. If we accept the statement found on page 87 of Part 1 of this report, that the entrance standard of six years more nearly applies to the city schools than does the entrance standard of seven years, then Norfolk, which has an eight-grade course, is the only city in which the pupils (1918-19) completing the elementary course have done so at the rate of one grade each year.

3. Slow and irregular progress in grades three and four or four and five is evident in several cities. The grade records included in the foregoing section should stimulate the study of local situations to determine whether one or all schools contributed to the low city scores and should result in such efforts to improve the work of those classes now inferior in

reading ability as will bring them up to the level of the classes which make a superior showing.

4. Though the evidence that the average pupil in the city schools does read well is cause for distinct satisfaction, it should not obscure the fact that there exist in every Virginia system large numbers of individual pupils, and even entire classes in certain schools, who read very poorly.

5. Marked differences are to be found in the accomplishment of a given grade in the several cities, and decided variations are evident in the performance of the different classes of the same grade of a single school system. Such variations in the achievement of the several classes in given grades in one system often are the equivalent of normal progress through two and even three grades.

H. IMPROVEMENT OF SILENT READING IN VIRGINIA SCHOOLS

Three means will be here suggested for improving reading in the Virginia schools. First is the improved classification of children, which will be discussed in detail in Chapters VIII and IX. The second means is greater emphasis upon reading throughout the elementary school, particularly in the intermediate grades, where the evidences of unequal progress are outstanding. In view of the importance of silent reading as a tool for the mastery of all other subjects in the curriculum, it should receive increased consideration both as a regular school subject and as a basis of promotion from grade to grade. The third means to be suggested is improved technique in the teaching of reading. This should be given increased attention in the training of teachers and supervisors. Particularly the aims of reading in the elementary school should be clarified, and there should be made available definite standards of achievement for the several grades. In planning to develop this improved technique, attention should be directed to the following points: (1) the fundamental differences in function of oral and of silent reading; (2) the results to be accomplished by oral reading in the primary grades; (3) the necessity of making silent reading a definite subject to be taught in the time allotted to reading, beginning with the primary grades; (4) the proportionately greater

emphasis which should be given silent reading as compared with oral reading, after grade three; (5) the rate of development in oral and silent reading normally to be expected through the successive grades; (6) the relative emphasis to be placed upon "thought-getting" as compared with the mechanics of reading, from the moment reading is begun in grade one; (7) the relation between rate and comprehension in reading; (8) the value of much reading of suitable material as a factor in developing rate and comprehension of thought, and (9) the necessity of such a supply of reading materials as will permit pupils to read material in accordance with ability and interests rather than compel a continuation of the old deadening process of subjecting all to a "set" reader.[1]

No attempt will here be made to elaborate these several points. Abundant help may be found in numerous books and magazines now devoted to this subject. Attention, however, may properly be called to a recent inquiry directed to supervisors and superintendents in various sections of the country to learn how their most successful teachers of reading provide for individual differences in the abilities of pupils. This inquiry, conducted by Doctor William Theisen of the State Department of Public Instruction of the University of Wisconsin, developed two types of remedial measures. The preliminary provisions include: (1) attention to physical needs; (2) better classification of pupils (including flexibility of promotion in addition to organization of special classes of extremely inferior and superior pupils); (3) the use of standard tests to determine pupil ability. The teaching provisions fall into six groups: (1) arrangement of pupils in small groups to permit adaptation of materials on basis of difficulty and interest for pupils; variation in character of instruction; (2) provision of reading material of varying degrees of difficulty; (3) variation in amount of reading practice; (4) individual attention to specific reading defects; (5) development and utilization of individual interests; (6) specific forms and phases of instruction, such as use of problem-projects which develop motives to increase reading skill, special exercises to increase speed, and special reading to improve comprehension.

[1] See pages 102–105 of Part 1.

A final word may be said regarding the importance of furnishing supplementary reading material.[1] Several schools report a library consisting of a dictionary, and one or two others add the "almanac." Satisfactory reading results cannot be obtained under these conditions. Here and there books other than texts are to be had, and one school reports a small library of 124 books. These few exceptions, however, but emphasize the distressing lack of interesting and stimulating books for school children, especially in the rural schools of Virginia. Many states have made provision not only for libraries in city schools, but for libraries in the remote rural districts. One state has 6,642 libraries totaling 1,185,817 volumes. Every one-room school in that state has a library. The importance of making such library provision for the school children of Virginia is incalculable.

SUMMARY OF RECOMMENDATIONS FOR IMPROVEMENT OF THE WORK IN READING IN VIRGINIA CITY SCHOOLS

1. Improved classification of pupils.
2. Greater emphasis upon reading as a regular grade subject, fundamental to the mastery of other subjects in the curriculum and as a basis for promotion.
3. Increased training of supervisors and teachers in the psychology of reading and in the scientific technique of teaching reading.
4. More definite knowledge on the part of supervisors and teachers of the aims of reading instruction and standards of accomplishment for the several grades, and observance of these aims and standards in the classroom teaching.
5. The use of standard reading tests to aid in supervision; to aid in the perception and analysis of individual pupil needs; to evaluate methods and to note progress.
6. More definite recognition of individual differences in reading ability and organization of class instruction to develop each pupil as far as may be, in accordance with his native capacity and previous training.
7. Increased supply of reading material for class and supplementary use. Enlargement of school libraries and greater coördination between schools and community libraries.[1]

[1] See pages 102–105 of Part 1.

CHAPTER IV

PRIMARY READING

THE reading achievement in grades one, two, and three was measured by a reading examination devised during the course of the survey. This reading examination, Sigma 1, is composed of two tests, both of which may be taken in a thirty-minute period. Test 1 is a sentence and paragraph reading test. Accompanying the sentences and paragraphs are pictures. In each case there is a direction for the pupils to make some mark upon the picture. This is the only response of the pupil. Whether or not the pupil is able to read the sentence is measured by the kind of marks which he makes on the picture. He is not required to do any writing. The items of the test — twenty-five in number — are arranged in order of difficulty, the easiest one being placed first and the succeeding ones being more difficult. In the construction of the test, careful attention was given to selecting only those words which were found in the primers and first-grade readers. Presumably an intelligent child who had had proper instruction in primary reading should be able to make a score on the easier parts of the test. As he proceeds through the tests, however, the items become more difficult, and towards the end only third-grade children will be able to read and respond properly to the directions. The test is given principally as a "power" test, not as a speed test — twenty minutes in time being allowed, which is more than most first and second or even third-grade children will be able to use.

This test is preceded by a fore-exercise which is given as a lesson in which the pupils are instructed exactly how to perform the various things called for later in the test. Adequate attention is given to this fore-exercise, so that presumably every child of normal intelligence should be able to follow the directions in the test proper. This test with its fore-exercise occupies seven pages of an eight-page booklet.

Page eight of this booklet contains test 2, which also is a

sentence reading test modeled after the so-called "Devens Literacy" test. This test consists of twenty interrogative sentences arranged in order of difficulty. It is preceded by a fore-exercise which, as in the case of test 1, is taught to the pupils before the test proper is given. The only response called for on the part of the child is to make a line under one of two words, "Yes" or "No," whichever may be the correct answer to the question asked. The time allowed for this test is two minutes.

In Table 20 are given the scores for approximately two thousand (1911) white pupils in the primary grades of Norfolk and Richmond. The facts for the rural schools are shown in Table 21 and for cities outside of Virginia in Table 22. The outstanding fact observable in these tables is the extensive overlapping which the several grades show. This matter will be given detailed discussion in Chapters VIII and IX.

The results of the test both in the Virginia schools and elsewhere indicate that the Sigma 1 examination is well adapted to measure the reading achievement of second and third grade children. It is usable also in the second half of the first grade, but the large number of zero scores in this grade for test 2 indicates that this part of the examination is too difficult to give a satisfactory rating to all first-grade children. Even with first-grade classes, however, it gives a class score which shows whether the class as a whole has satisfactory reading ability. A study of the correlations indicates also that the examination is a good measure of intelligence for children of seven years and above who have been to school. (See Chapter VIII.)

This reading examination was given to about twelve hundred children in Richmond, about eight hundred in Norfolk, and more than seven hundred in rural schools. About a thousand tests were given outside the state of Virginia in order to secure comparable scores. Table 22 shows medians for the several groups.

As measured by median scores the Virginia city schools make a showing about average in the second and third grades. Neither Richmond nor Norfolk scores as high in

TABLE 20

Reading Examination Sigma 1. Distribution and median scores for grades one, second half, to three, second half, in the cities of Norfolk and Richmond; 1911 white pupils

Score	Test 1						Test 2					
	Grade 1	Grade 2		Grade 3		Total	Grade 1	Grade 2		Grade 3		Total
	2d Half	1st Half	2d Half	1st Half	2d Half		2d Half	1st Half	2d Half	1st Half	2d Half	
22	.....	.....	4	5	2	11	.....	.....	.....	.....	.....	.....
21	.....	.....	2	5	14	21	.....	.....	.....	.....	.....	.....
20	.....	1	3	9	23	36	.....	.....	4	4	14	22
19	.....	1	8	10	24	43	.....	.....	.....	1	9	10
18	.....	.....	8	16	42	66	.....	.....	3	11	31	45
17	1	.....	19	26	45	91	.....	.....	5	7	20	32
16	1	5	31	23	41	101	.....	.....	4	23	46	73
15	1	8	19	21	(32)	81	.....	.....	5	14	22	41
14	.....	6	31	31	33	101	1	1	19	21	48	90
13	1	4	34	29	37	105	1	2	14	25	(27)	69
12	2	6	47	(19)	24	98	.....	2	23	45	43	113
11	.....	7	36	32	24	99	.....	3	31	19	29	82
10	2	19	(36)	39	19	(115)	2	3	38	(27)	35	105
9	9	14	35	15	13	86	3	4	38	30	20	95
8	6	12	39	16	18	91	2	10	47	33	19	111
7	11	23	36	13	5	88	6	13	(42)	18	9	(84)
6	23	33	23	14	2	95	11	19	44	24	6	104
5	18	(21)	24	17	5	85	14	29	46	16	13	118
4	29	24	18	10	2	83	26	(30)	27	14	6	103
3	53	25	28	7	3	116	43	30	31	13	6	123
2	(68)	22	9	4	.....	103	60	40	35	4	.....	139
1	60	32	13	5	.....	110	(69)	37	24	4	.....	134
0	53	21	8	2	.....	84	104	62	33	15	5	219
Total	338	284	513	368	408	1911	338	284	513	368	408	1911
Median	2.8	5.9	10.6	12.5	15.6	10.1	2.1	4.1	7.4	10.5	13.2	7.3
A. D.	2.0	3.4	3.9	4.0	3.2	5.1	1.9	2.3	3.5	3.8	3.4	4.6

TABLE 21

Reading Examination Sigma 1; distributions and medians for pupils of eleven rural schools in five counties

Scores	Test 1 — 703 Pupils			Test 2 — 701 Pupils		
	Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
22	.....	1	.....	.....	.....	.....
21	.....	1	4	.....	.....	.....
20	.....	1	10	.....	1	11
19	.....	3	13	.....	1	1
18	.....	4	22	.....	2	15
17	.....	5	17	.....	1	4
16	2	6	20	.....	3	21
15	.....	9	21	.....	5	7
14	.....	8	**19**	.....	4	22
13	1	9	14	.....	1	14
12	3	15	14	.....	8	**28**
11	2	11	18	.....	8	14
10	7	22	14	.....	16	14
9	4	**18**	10	1	14	18
8	7	20	9	2	17	12
7	10	11	6	1	5	11
6	13	16	3	4	15	15
5	10	15	4	11	**17**	3
4	22	12	3	15	22	6
3	31	16	1	20	17	2
2	**38**	6	4	28	15	4
1	44	7	2	35	15	3
0	58	5	.....	**135**	35	4
Totals	252	221	228	252	222	229
Medians	2.6	9.1	14.6	0.9	5.4	12.3
A. D.	2.3	3.8	3.6	.....	3.8	3.7

NOTE. Figures in heavy type indicate groups in which the medians lie.

the first grade as might be desired, nor as high as they should score if the difficulty of the test is at all accurately gauged by what the children in St. Louis, Madison, Bloomington, Minneapolis, and Santa Anna do with it. It is possible that the classes tested in these cities were more highly selected

TABLE 22

Reading Examination Sigma 1, showing median scores for Richmond, Norfolk, eleven rural Virginia schools, and six cities outside of Virginia

Schools	Scores by Grades (Second Half)					
	Test 1			Test 2		
	Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
Richmond City	2.4	10.5	15.0	1.7	7.4	14.1
Norfolk City..	3.7	10.8	17.0	2.3	7.3	12.0
Rural.....	2.6	9.1	14.6	0.9	5.4	12.3
Outside cities..	5.1	11.4	16.6	2.8	6.6	13.0

than those in Virginia and, therefore, show scores higher than the average for the city schools throughout the country, though there is no reason to suppose that such is the case. Even if this is the case, it is probably fair to interpret the first-grade scores for Richmond and Norfolk as slightly below average. On test 1 the second-grade scores for these cities are also slightly lower than the average for the outside cities, but the third-grade scores are practically the same. On test 2 the Virginia cities manifest a better score than outside cities.

Rural schools manifest a distinctly inferior achievement. In no case except that of grade one in test 1 and that of grade three in test 2 do the rural pupils equal the score of either Virginia city in either test. Always they score lower than the outside cities.

To this low score should be connected the fact that the rural pupils are as old or slightly older, grade for grade, than are the pupils in Norfolk or Richmond. The ages and number of children concerned in each case may be seen from Table 23.

Just what it means for a child, class, or school to make a score of 3 or less on test 1 will be clear from an examination of the test itself.

There are just twelve words aside from "a" and "the"

TABLE 23

Median ages of primary pupils examined by the reading test, Sigma 1

Schools		Grade 1		Grade 2		Grade 3	
		1st Half	2d Half	1st Half	2d Half	1st Half	2d Half
Richmond	Age.....	6.6	7.6	8.1	8.8	9.6	9.7
	Number...	46	182	142	212	214	128
Norfolk	Age.....	.....	7.1	7.8	8.3	9.4	9.1
	Number...	.....	166	69	177	119	168
Rural	Age.....	.....	7.5	.....	8.6	.....	9.8
	Number...	.....	168	.....	201	.....	301

which the child must know in order to read the three sentences required for a score of 3. Five of these words are actually taught him during the fore-exercises on page 1 of the test. He must be able to recognize just seven additional words as follows: "tail," "this," "pig," "around," "squirrel," "wing," "goose." All these words are in the Jones list of words common to ten primers and all of them are found in the first readers used in the Virginia schools. To acquire a knowledge of these words, to understand them when they are seen in sentences, and to follow the directions which they give, seems a small achievement for one year of schooling. Yet more than fifty per cent of the Virginia first-grade children tested could not equal a score of 3.

Even this is not quite a fair statement of the case. A child was not confined to the first three sentences in order to score 3. He might fail on sentence 3 if he could read sentence 4 with the words "find," rabbit's," "make," "it," "longer," or if he could read sentence 5 with the words "each," "bird," "that," "is," and "ground."

It is admitted that the ability to recognize the words in question is not the only thing involved. There are equally important factors of the relations of words and the ability to follow directions, the latter certainly being a matter of intelligence. Conceding all these matters, however, it is still

probable that where reading has been taught, there the pupil will make the highest scores in this test, and judged by this criterion, the rural schools are giving results distinctly inferior to the city schools, which are certainly not above the median for the country at large.

The Virginia schools measured should be concerned not merely because of a low average reading score in the early grades. Equally important is the inequality of achievement of children in the same grade and of the same age and intelligence. This matter is considered in part in the chapter on the classification of children, but certain facts may also be noted here. For seven 2B classes in the city of Richmond the median scores were as follows: 8.5, 11.7, 11.0, 12.6, 10.2, and 4.0 in test 1, and 5.0, 9.6, 7.5, 10.0, 6.0, 7.3, and 4.0 in test 2. For six 2A classes in Norfolk the median scores were: 12.0, 11.0, 12.0, 4.0, 14.0, and 12.0 in test 1, and 8.0, 8.8, 8.0, 4.4, 9.0, and 8.3 in test 2. Similarly, the median scores for six rural schools were respectively 8.0, 12.0, 10.0, 3.0, 10.0, and 8.0 in test 1, and 5.0, 8.0, 3.0, 0.0, 6.0, and 3.0 in test 2.

Yet all of these classes were completing the second year of schooling and were of about the same chronological age. The classes with the lowest chronological age actually made the superior scores. The range of these median scores from 4 to 12 in each of the cities is almost the range between the first and third grade scores for the cities as wholes. This means that some second grades are doing only one half to one third as much as others do with the same amount of schooling.

Some of this variability may be charged to the difference in ability on the part of the pupils, but some of it is also apparently chargeable to poor instruction, and to poor administration and supervision.

CHAPTER V

ARITHMETIC

IN determining the efficiency of a school system in arithmetical instruction, at least two products of training should be considered: first, such skills as are involved in the ability to add, subtract, multiply, and divide simple and compound numbers expressed as integers, fractions, and decimals; second, the more complex ability, commonly called reasoning, involved in the solution of arithmetical problems.

THE TESTS USED

In attempting to measure the quality of instruction in arithmetic in the schools of Virginia, two tests were used. The Woody Scales in addition, subtraction, multiplication, and division, which, according to the author of these scales, are designed to measure achievement in the "fundamentals of arithmetic," were used for this purpose. Series B, which "was especially constructed for use in measuring school systems where the amount of time for testing purposes is limited,"[1] was used in order to secure the greatest amount of data in the least time.

Several features of the Woody Scales suggested their use in the survey. First, scales are available for the four fundamental processes; second, the items of each of the scales were such as pupils meet frequently in good schools and later in life; third, the items of each scale are arranged in an order of difficulty so that young children may perform the easy ones, and yet good pupils in the upper grades are not often able to complete the entire test in the time allowed; fourth, the scales are fairly reliable inasmuch as children on a second trial of the same test do not alter their scores greatly; fifth, the results of the tests correlate fairly high with other good measures of school achievements, probable that where reading has been best taught, there the pupils will make the

[1] Woody, *Measurement of Some Achievements in Arithmetic*, p. 3.

and finally, there are available adequate norms for comparative purposes.

In order to secure a measure of the ability of Virginia children to solve arithmetical problems the data secured from Exercise 2 of the Intelligence Examination, Delta 2, were used. This exercise is a series of graded reasoning problems in arithmetic, used in the first instance as a part of the intelligence examination, but available also as a measure of the ability to solve problems in arithmetic. Both of the tests were taken by the children on the same day.

THE DATA USED

The data used in this chapter were secured from the records made by white and colored children in both city and rural schools. These children were all in grades three to seven inclusive, according to the Virginia seven-grade system, with the exception of those in the cities of Harrisonburg and Norfolk, who were in grades from three to eight. The data represent the examination record of 2557 white children from the city schools and 5021 white children in the rural schools, and of 372 colored children in the city schools and 770 colored children in the rural schools. These schools in the judgment of the survey staff furnish a fair representation of the work in the rural and city schools throughout the state.

THE ORGANIZATION OF THE DATA

In presenting the results of the tests no attempt is made to show the work of individual schools or to compare the work of one school with another. It was not the intention to find individual schools in the state where the work was of unusually high quality, nor to locate schools where the work might be found to be on a low plane. It was rather the intention to secure such facts as would give a fair picture of the arithmetic work in the several types of schools to be found in the state. For example, more than two thirds of all the non-city schools in Virginia are one-room schools, more than one sixth are two-room schools, while less than one sixth have three or more rooms each. It is evident that it is of

more importance to present the facts that will throw some light on the efficiency of instruction in the one-room and two-room schools throughout the state than to furnish specific illustrations of schools or grades wherein good or bad teaching obtains. With this larger purpose in view, the data are presented under the following main divisions: scores made by white children in each city having a separate administrative organization; scores by white children in rural schools containing one room, two rooms, three rooms, and four rooms, and by colored children in these same types of schools. In some grades where the number of records from children was deemed insufficient to secure a valid median score, the record has been omitted.

THE TECHNIQUE OF COMPARATIVE SCORES

In order to determine how the achievement of Virginia school children in the fundamentals of arithmetic compares with the achievement of school children throughout the country, two methods of comparison are used: first, comparison with the Woody standards, and second, comparison with the median scores made by children in other cities where the Woody Scales, Series B, have been used. In order to make these comparisons valid it is necessary to keep in mind just what each score used represents.

In the majority of school systems throughout the country the elementary school term is divided into eight grades. Children who complete these eight grades of work complete the elementary school program. This is true in all cities whose scores have been used for comparison with the Virginia scores. The Virginia schools have a seven-grade system. Virginia children complete their elementary school at the end of the seven years, and, if that practice is valid, they should have the same efficiency that pupils in an eight-grade system have after eight years in school. If the Virginia schools are doing the work of the elementary grades as efficiently as it is being done in schools outside of Virginia, then it is to be expected that at the end of the seventh grade children in the Virginia schools should compare favor-

ably in achievement with children in an eight-grade system at the end of the eighth grade.[1] It is obvious, therefore, that a Virginia fifth grade should exceed the score of the fifth grade in an eight-grade system, probably by about five sevenths of a year's work, and similarly other Virginia grades should score correspondingly high.

The comparison of Virginia scores with Woody standards is further complicated by the time of year when the tests were given. Woody standards are for the beginning of the school year. The Virginia tests were given near the end of the school year. When, therefore, we compare the Virginia scores with Woody standards grade for grade and with the results from most Northern and Western cities, we are giving to the Virginia cities whatever advantage would accrue to them by virtue of five or six month's additional work.[2]

THE FUNDAMENTALS IN VIRGINIA CITIES

White Schools

If one keeps in mind the essential technique of comparison outlined above, it is possible to interpret the Virginia city scores with some degree of accuracy. The place where this comparison can be made in the most clear-cut fashion is at the end of the elementary school course. If the Virginia cities are teaching the fundamentals of arithmetic as efficiently as the cities outside the state, it would seem that Virginia children at the end of the seventh grade should score as high as do children in the eight-grade system at the end of the eighth grade. A study of Tables 24 and 25 will show, however, that Virginia cities do not reach a favorable standing in comparison with the work of the outside cities. The Woody standard obtained from Northern schools at the beginning of the eighth grade, when children are almost a full school year short of completion of the elementary work,

[1] For a complete discussion of this point see Chapter II.

[2] It would be possible to work out mathematically a statement for the amount of school work which each score represents. Such refinement of technique, however, is unnecessary to show the essential facts about the Virginia situation.

TABLE 24

Woody Arithmetic Scales, Series B. Median scores of white children in Virginia cities at the end of the elementary school (seven-grade course); also Woody standards for beginning eighth grade

	Addition	Subtraction	Multiplication	Division
Woody Standard	18.5	14.5	18.0	14.0
Richmond	14.5	13.5	17.2	11.5
Newport News	14.4	11.6	15.8	.....
Lynchburg	16.3	13.4	15.9	.....
Charlottesville	15.3	16.0	11.2	.....
Roanoke	16.1	14.6	11.3	.....
Portsmouth	16.5	.....	16.9	12.1
Danville	16.0	.....	17.2	13.9

is in practically every case higher than the median scores made by any Virginia city. Danville, Portsmouth, Roanoke, and Lynchburg children score sixteen or more points in addition at the end of the seventh year as measured by these tests, but this is two full problems short of the Woody standards for the *beginning* of the final year of the elementary school. The highest addition score made by any Virginia city was 16.5, whereas it should have been 18.5 from six to eight months earlier in the school program. As a matter of fact, this score of 16.5 is practically the Woody standard for the fifth grade.

In subtraction, Charlottesville and Roanoke equal or exceed the Woody standard for beginning of the eighth grade, but all other cities fall one or two grades below the point where the Woody standards indicate they should be. No city scores are as high in multiplication as the Woody standards require, although Danville and Richmond, standing at the top of the list, at the *end* of the year approach the Woody standards for the beginning of the year. In division, data were available for only three of the cities, Richmond, Portsmouth, and Danville. Danville practically equaled the Woody standard, while the other two fell distinctly below.

TABLE 25

Woody Arithmetic Scales, Series B. Scores made by certain cities outside of Virginia at the beginning of the eighth grade of the elementary school

Cities	Addition	Subtraction	Multiplication	Division
Webster City, Iowa.....	18.1	14.4	17.9	14.0
Hoquiam, Washington...	17.8	15.0	18.8	13.8
Denver, Colorado.....	15.7	14.5	15.8	12.0
Seattle, Washington.....	17.4	14.2	17.8	13.0
Pittsburgh, Pennsylvania.	17.7	14.9	18.5	13.9
Idaho Springs, Colorado..	15.5	13.5	15.2	16.3

This unfavorable comparison with the Woody standards for these several grades in the several processes is further emphasized by comparison of the Virginia schools with the cities outside of Virginia. In the majority of cases, the children of these outside cities exceed the achievement of those in Virginia. When we remember that the children in the Northern and Western cities have an additional year for practice in improving their skill in the fundamentals before completing the elementary school course, the inadequacy of the Virginia seven-grade course is even more marked. On the basis of these figures, therefore, it seems fair to conclude that Virginia city children are not acquiring the skill in the fundamentals which should be expected under good school instruction.

HARRISONBURG

Harrisburg is the only Virginia city having an eight-grade elementary school from which we have complete data. In order to throw some light on the relative efficiency of the two systems of organization the scores made in the Harrisonburg schools should receive special attention These scores together with the Woody standards are given in Table 27. In this table the median scores made by children in the second half of each grade only are used, and since our tests were given at the end of the term, the number of the grade represents also the exact number of grades completed by this

TABLE 26

Woody Arithmetic Scales, Series B. Median scores of white children in the cities of Virginia in each Virginia grade. Also Woody standards for beginning of grades in eight-grade system

Grade	Woody Standard	Norfolk		Richmond		Newport News		Lynchburg		Charlottesville		Roanoke		Portsmouth		Danville		Harrisonburg	
		L*	H*	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H
Addition																			
3	9.0	8.3	9.7	7.0	8.2	8.1	9.8	9.1	11.4	6.6	8.5	9.9	9.4	....	....	....	11.9	....	10.2
4	11.0	10.2	10.5	10.6	12.1	11.2	11.1	12.0	11.3	8.5	10.2	12.5	13.0	10.0	10.5	....	13.5	....	13.8
5	14.0	13.5	13.8	14.0	14.2	....	....	13.7	14.5	....	....	13.0	14.4	15.5	14.5	12.8	13.8	....	15.1
6	16.0	13.1	15.7	14.6	15.5	13.0	....	15.1	15.6	12.8	15.0	14.7	15.0	15.2	15.3	12.8	14.3	....	17.0
7	18.0	15.2	15.1	14.8	14.5	15.5	14.4	15.7	16.3	14.0	15.3	15.5	16.1	17.0	16.5	....	16.0	17.3	17.3
8	18.5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	18.3
Subtraction																			
3	6.0	7.7	6.5	7.2	6.7	7.2	8.0	8.5	9.0	7.5	7.5	8.2	8.0	....	7.8	....	12.0	....	....
4	8.0	8.1	9.8	8.5	9.5	8.6	10.2	9.0	10.0	8.3	8.6	9.5	9.4	7.4	7.5	....	....	....	....
5	10.0	9.5	10.8	11.4	12.0	....	....	11.0	11.2	9.4	11.4	11.7	11.8	11.5	....	....	12.6	....	....
6	12.0	....	....	12.1	13.3	....	....	13.0	12.6	12.1	12.5	12.1	13.1	13.1	....	12.5	12.5	....	....
7	13.0	12.0	11.9	12.5	13.5	13.1	11.6	13.7	13.4	....	16.0	14.3	14.6	....	....	....	14.2	....	....
8	14.5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Multiplication																			
3	3.5	5.9	5.2	3.3	7.6	3.9	6.8	3.7	....	4.6	6.0	6.6	7.7	....	8.6	....	....	....	8.7
4	7.0	9.1	9.9	10.7	10.3	8.0	....	....	....	....	....	8.5	8.7	9.3	10.7	....	....	....	11.2
5	11.0	9.2	12.5	11.6	13.2	....	....	11.0	12.5	....	....	11.2	11.1	10.6	14.1	....	....	....	14.9
6	15.0	12.0	13.1	14.5	15.3	13.9	....	15.0	15.4	12.6	15.0	13.5	13.4	10.5	15.6	....	....	....	16.5
7	17.0	....	13.5	15.2	17.2	15.0	15.8	15.4	15.9	13.7	11.2	....	11.3	....	16.9	....	....	....	17.0
8	18.0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	18.4
Division																			
3	3.0	....	....	4.2	4.5	....	....	....	6.8	....	....	4.3	3.6	....	....	....	4.6	....	4.6
4	5.0	6.1	5.6	6.0	6.9	4.7	5.1	7.2	8.1	4.3	5.2	4.9	6.2	....	5.6	....	6.0	....	6.9
5	7.0	6.0	9.5	9.0	9.5	....	....	....	....	7.4	9.3	5.7	....	6.4	9.0	6.6	9.3	....	10.7
6	10.0	8.6	10.8	9.8	10.7	8.5	....	....	....	....	....	10.2	10.2	11.2	11.6	7.0	....	....	12.6
7	13.0	11.2	11.2	10.9	11.5	....	....	....	....	10.6	....	....	....	13.9	12.1	....	....	....	12.0
8	14.0	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	13.8

* L = first half grade; H = second half grade.

TABLE 27

Woody Arithmetic Scales, Series B. Median scores for Harrisonburg (eight-grade system) and Woody standards. Addition, multiplication, and division. Harrisonburg scores represent about three fourths of a year more school than the Woody scores

	III	IV	V	VI	VII	VIII
Addition						
Woody standards	9.0	11.0	14.0	16.0	18.0	18.5
Harrisonburg	10.2	13.8	15.1	17.0	17.3	18.3
Multiplication						
Woody standards	3.5	7.0	11.0	15.0	17.0	18.0
Harrisonburg	8.7	11.2	14.9	16.5	17.0	18.4
Division						
Woody standards	3.0	5.0	7.0	10.0	13.0	14.0
Harrisonburg	4.6	6.9	10.7	12.6	12.0	13.8

group. An examination of the scores in Table 27 shows that, if we accept the Woody standards as a criterion, the work in the fundamental processes in arithmetic in the Harrisonburg schools is very efficient. The median scores made by Harrisonburg pupils in almost every grade and in each process tested reach the standards set by Woody and in several cases exceed the standards. There is no other Virginia city here considered which makes the same consistently high record, and only in a few cases in cities other than Harrisonburg have the Woody standards been reached or exceeded. It may not be correct to charge this efficient work entirely to the eight-grade organization. It is probably significant, however, that of the schools tested the only Virginia city at all approximating the Woody standards is one with this type of program.

RURAL WHITE SCHOOLS

The non-city schools of Virginia are responsible for the education of about four fifths of all the school children in the state. More than two thirds of the rural schools have but one teacher, more than one sixth have but two teachers each, while the remaining schools (less than one sixth) have

TABLE 28

Woody Arithmetic Scales, Series B. Median scores, white children in non-city schools of Virginia grouped by one-teacher, two-teacher, three-teacher, and four and more teacher schools. Also Woody standards for corresponding grades

	Addition	Sub-traction	Multi-plication	Division
Third Grade				
Woody standards	11.0	8.0	7.0	5.0
One-teacher	6.8	5.9	3.6	2.5
Two-teacher	7.8	5.7	6.1	3.3
Three-teacher	7.2	6.1	4.6	3.5
Four and more teacher	8.7	8.4	7.1	3.2
Fourth Grade				
Woody standards	14.0	10.0	11.0	7.0
One-teacher	8.4	8.0	6.1	4.1
Two-teacher	9.8	8.1	7.3	4.5
Three-teacher	10.3	8.2	8.7	4.4
Four and more teacher	12.1	9.1	9.7	6.7
Fifth Grade				
Woody standards	16.0	12.0	15.0	10.0
One-teacher	11.2	9.3	10.4	5.9
Two-teacher	11.2	9.5	10.1	5.0
Three-teacher	10.2	9.7	10.2	5.0
Four and more teacher	13.8	11.4	10.7	7.8
Sixth Grade				
Woody standards	18.0	13.0	17.0	13.0
One-teacher	11.3	9.7	11.3	6.0
Two-teacher	12.6	11.8	11.6	9.2
Three-teacher	13.1	7.8	11.5	9.1
Four and more teacher	14.4	12.9	14.0	9.5
Seventh Grade				
Woody standards	18.5	14.5	18.0	14.0
One-teacher	13.6	11.5	14.1	10.0
Two-teacher	14.8	.....	14.8	10.9
Three-teacher	14.4	11.9	15.2	10.9
Four and more teacher	16.1	14.0	14.5	11.4

three or more teachers each.[1] Obviously the fact that so large a portion of the state's children are confined to such schools for their education makes the quality of work which these schools do of great importance.

A comparison of the work in fundamentals of arithmetic as measured by the Woody Scales, Series B, in schools having one

[1] *Virginia Public Schools, Education Commission Survey and Report*, Chapter XV.

TABLE 29

Woody Arithmetic Scales, Series B. Median scores of colored children in non-city schools of Virginia grouped by one-teacher, two-teacher, three-teacher, and four or more teacher schools. Also Woody standards for corresponding grades

	Addition	Subtraction	Multiplication	Division
Third Grade				
Woody standards	11.0	8.0	7.0	5.0
One-teacher	6.2	6.1	2.5	2.7
Two-teacher	5.5	6.6	4.1	2.5
Three-teacher	8.3	7.6	4.9	3.5
Fourth Grade				
Woody standards	14.0	10.0	11.0	7.0
One-teacher	8.1	7.4	4.6	3.5
Two-teacher	6.1	7.0	5.9	3.3
Three-teacher	10.7	9.0	6.7	4.5
Fifth Grade				
Woody standards	16.0	12.0	15.0	10.0
One-teacher	10.6	9.2	7.8	6.7
Two-teacher	11.3	8.7	8.3	4.9
Three-teacher	11.3	9.5	9.7	7.8
Sixth Grade				
Woody standards	18.0	13.0	17.0	13.0
One-teacher	11.1	9.0	8.9	5.0
Two-teacher	12.1	9.2	8.7	6.5
Three-teacher	13.5	9.9	11.4	6.7
Seventh Grade *				
Woody standards	18.5	14.5	18.0	14.0

* Not enough data to warrant inclusion.

teacher, two teachers, three teachers, and four and more teachers is shown in Table 28 for white children.

Table 29 shows a comparison of the scores of colored children in one-, two-, and three-teacher schools. The amount of data secured from non-city schools in Virginia having four rooms and over for colored children is too small for inclusion in the table.[1]

An examination of these tables shows that the best work in Virginia non-city schools in arithmetic is done in the schools having four and more teachers. How far short

[1] There are only nine non-city schools of four teachers or over for colored children in Virginia.

TABLE 30

Woody Arithmetic Scales. Median scores for white children in Virginia rural one- and four-teacher schools.

Grade (according to Virginia Seven-grade System)	III	IV	V	VI	VII
Addition					
One-room	6.8	8.4	11.2	11.3	13.5
Four-room	8.7	12.1	13.8	14.1	16.1
Subtraction					
One-room	5.9	8.0	9.3	9.7	11.5
Four-room	8.4	9.1	11.4	12.9	14.0
Multiplication					
One-room	3.6	6.1	10.4	11.3	14.1
Four-room	7.1	9.7	10.7	14.0	14.5
Division					
One-room	2.5	4.1	5.9	6.0	10.0
Four-room	3.2	6.7	7.8	9.5	11.4

these best rural schools come from satisfactory work can best be shown by a comparison with the Woody standards. In no one of the fundamental processes do the children achieve a satisfactory rating. Those children who remain in these schools to the end of the elementary course are still below the achievements of the best city schools of Virginia and below the Woody standards by one to two and a half grades. Where they should score more than eighteen in addition they score 16.1; they reach their best relative score in subtraction, but are still one half grade short of the score they should make. In multiplication they are two and a half grades short and in division one and a half grades short.

THE ONE-TEACHER SCHOOL

The four-teacher schools, unsatisfactory as their arithmetical product proves to be, are still superior to the schools taught by one teacher. It is in the latter, which constitute about two thirds of all the non-city schools of the state, that Virginia's arithmetical achievement falls to its lowest level. Measured by the Woody standard, by Virginia city schools, by the achievement of Virginia non-city graded schools, or

TABLE 31

Woody Arithmetic Scales. Median scores for white and colored children in Virginia rural one-teacher schools, also the Woody standards

Number of Grades of an Eight-grade System Represented in Each Score	3.14	3.25	4.25	4.28	5.25	5.42	6.25	6.57	7.25	7.71
Addition										
Woody Standard	....	11.0	14.0	....	16.0	....	18.0	....	18.5	....
One-room (white)	6.8	....	....	8.4	....	11.2	....	11.3	....	13.5
One-room (colored)	6.2	....	....	8.1	....	10.6	....	11.1	....	....
Subtraction										
Woody Standard	....	8.0	10.0	....	12.0	....	13.0	....	14.5	....
One-room (white)	5.9	....	....	8.0	....	9.3	....	9.7	....	11.5
One-room (colored)	6.1	....	....	7.4	....	9.2	....	9.0	....	....
Multiplication										
Woody Standard	....	7.0	11.0	....	15.0	....	17.0	....	18.0	....
One-room (white)	3.6	....	....	6.1	....	10.4	....	11.3	....	14.1
One-room (colored)	2.5	....	....	4.6	....	7.8	....	8.9	....	....
Division										
Woody Standard	....	5.0	7.0	....	10.0	....	13.0	....	14.0	....
One-room (white)	2.5	....	....	4.1	....	5.9	....	6.0	....	....
One-room (colored)	2.7	....	....	3.5	....	6.7	....	5.0	....	....

by the records from cities outside the state, these schools (white or colored) fail to train their pupils to adequate arithmetical skills.

In Table 30 may be seen the comparison between the median scores for white children in Virginia rural one-teacher schools and in four-teacher schools. The difference in arithmetical achievement between the children in these two types of schools is obvious. In almost every case the achievement of the children in one-room schools is inferior to the achievements of children in four-room schools. The highest median scores in addition in one-room schools (13.5) made by seventh-grade children has been exceeded two grades earlier by children in four-room buildings. In subtraction and in division the children in the one-room school are likewise two grades behind the children of the four-room schools. In multiplication, the difference is somewhat less in the seventh grade but as great in some other grades.

The showing made by children in the one-teacher colored

TABLE 32

Reasoning ability, arithmetical problems. General Intelligence Examination Delta 2 for white children in the first and second half of each grade in city schools. Haggerty standards for Exercise 2

Grade	3	4	5	6	7	8
Haggerty Standard	5.0	7.0	9.0	10.5	11.5	13.0
Norfolk, 1st half	4.9	6.4	7.3	10.1	10.6	9.8
" 2d half	.....	6.9	8.8	10.2	10.4	12.1
Newport News, 1st half	4.3	6.3	.....	9.0	.....	.....
" " 2d half	6.1	7.0	.....	.....	.....	.....
Richmond, 1st half	3.0	5.3	7.2	8.5	8.8	.....
" 2d half	3.9	5.9	8.0	9.2	10.3	.....
Charlottesville, 1st half	4.6	6.5	7.5	7.8	10.2	.....
" 2d half	.....	6.4	8.7	10.1	11.3	.....
Roanoke, 1st half	.....	6.3	8.9	.....	12.1	.....
" 2d half	3.9	6.0	8.6	.....	.....	.....
Portsmouth, 1st half	.....	.....	7.6	9.9	11.7	.....
" 2d half	5.9	6.9	8.7	9.9	11.8	.....
Lynchburg, 1st half	.....	7.6	8.1	.....	11.5	.....
" 2d half	.....	.....	8.7	10.9	11.9	.....

schools in the fundamentals of arithmetic, when compared with the achievement of children in the three-room colored schools (see Table 30), emphasizes the inferiority of the one-teacher school. The contrast between the scores made by children in these two types of schools is so marked that there can be no doubt as to the superiority of the four-room school or even of the three-room school.

Just how ineffective the work of the one-room school in Virginia really is, is more apparent when we compare the achievement of children in these schools with the Woody standards. This comparison is shown in Table 31. An examination of this table shows that the highest score (13.5) made by children in addition in one-room schools was made by white children who had completed the equivalent of 7.7 grades of an eight-grade course. Comparing this score with the Woody standard, we find that it should have been exceeded three and one half grades earlier. In other words, Virginia children in one-teacher schools at the completion of the elementary school course are two and one half grades

TABLE 33

Reasoning ability, arithmetical problems. General Intelligence Examination Delta 2 for colored children in city schools of Virginia and the Haggerty standards for Exercise 2

Grade	3	4	5	6	7
Haggerty Standard	5.0	7.0	9.0	10.5	11.5
Roanoke	3.5	6.0	.....	9.1	.....
Charlottesville	3.5	5.8	7.0	8.3	9.5
Norfolk	3.7	5.9	6.7	8.2	8.7
Lynchburg	5.2	5.5	7.0	.....	.....
Newport News	.....	5.6	5.5	8.5	7.1

TABLE 34

Reasoning ability, arithmetical problems. Exercise 2 of Intelligence Examination Delta 2 for white children in non-city Virginia schools of one room, two rooms, three rooms, and four rooms and over, and the Haggerty standards for Exercise 2

Grade	3	4	5	6	7
Haggerty Standard	5.0	7.0	9.0	10.5	11.5
One room	3.2	5.2	7.0	7.7	10.3
Two rooms	3.2	5.2	7.1	8.2	9.0
Three rooms	3.4	6.3	6.1	8.7	9.8
Four rooms and over	4.0	6.6	7.5	8.8	10.4

TABLE 35

Reasoning ability, arithmetical problems. General Intelligence Examination Delta 2 for colored children in non-city Virginia schools of one room, two rooms, and three rooms, and the Haggerty standards for Exercise 2

Grade	3	4	5	6	7
Haggerty Standard	5.0	7.0	9.0	10.5	11.5
One room	2.7	5.3	5.2	.....	.....
Two rooms	3.1	4.7	6.6	5.6	.....
Three rooms	4.3	5.5	7.4	7.8	9.1

below the standard in skill in addition. They are similarly low in multiplication and in division.

ARITHMETICAL REASONING

What the Woody tests in the fundamentals indicate concerning the teaching of arithmetic in Virginia schools is confirmed by the results of Exercise 2 of the Intelligence Examination Delta 2. This exercise is a graded series of arithmetical problems and was used wherever any of the achievement tests were used. Results are, therefore, available for a large variety of schools and large numbers of children. In Table 32 may be seen the results for the several city systems. The "standard" given in this table is based upon results of this test as given in Baltimore, Champaign, Cleveland, Evansville, Indianapolis, Louisville, Oakland, Omaha, Rochester, Stoughton, Aberdeen, and a number of other cities in Illinois, Iowa, Wisconsin, South Dakota, and California. The standard scores as given represent the average medians of scores for about ten thousand children. They would seem, therefore, to represent a fair expectation from good school conditions. In forty-five cases out of fifty-five, however, Virginia scores fall below this fair expectation, a result in general conforming with the results in the fundamentals.

Among the rural schools for white children, which stand next to the city white schools in the solution of arithmetical problems (see Table 34), the four-teacher schools uniformly score the highest, although in most cases even they are about one grade below where they should be. The one-teacher schools are in most cases the weakest of all.

In corresponding fashion the colored city schools, although they offer a product inferior (see Table 33) to that of the city white schools and in most cases inferior to that of the non-city schools, are still usually superior to the non-city colored schools (see Table 35), which in general have the lowest rating of all.

In summary of the arithmetical problems test, therefore, it may be said that the results confirm the findings in the fundamentals, which may be restated in the form of

GENERAL CONCLUSIONS

1. Virginia city white children, when they have completed the elementary seven-grade course, are not so efficient in the fundamentals of arithmetic as are children who have completed the eigth-grade elementary course in most parts of the country.

2. The city of Harrisonburg, Virginia, which has an eight-grade elementary course, made higher records than did any other Virginia city in the Woody tests.

3. The rural schools of Virginia are less efficient than the city schools.

4. The one-room schools of Virginia are so markedly inefficient that children in these schools do not acquire in their entire elementary course the skill in the fundamentals of arithmetic that is acquired by children in good schools in one half the time.

5. The grade scores in the Virginia schools show that the acquisition of knowledge and skill in the fundamentals of arithmetic is not consistently emphasized through the grades.

6. The work of the colored children in arithmetic in Virginia city schools is somewhat inferior to the work of the city white children. In the rural schools, when we compare the work in the same types of schools, there is less difference between the achievements of the children of the two races. However, colored pupils grade for grade are older.

RECOMMENDATIONS

1. Reduce to a minimum the number of one-teacher and two-teacher schools in Virginia, and through consolidation establish graded schools.[1] This alone will probably improve the work in arithmetic by two grades in the schools affected.

2. Acquaint teachers in both city and non-city schools with the standards reached in arithmetic in other cities in order that they may sufficiently emphasize the teaching of the fundamentals of arithmetic.

3. Increase the amount of practice in the fundamentals of arithmetic in the upper grades.

[1] See Part 1, Chapter XV.

TABLE 36

Woody Arithmetic Scales, Series B. Median scores for white children in second half of each grade in four cities outside of Virginia and median scores made by white children in some Virginia cities in second half of each grade

Number of Grades of an Eight-grade System Represented in Each Median Score.	3.00	3.42	4.00	4.75	5.00	5.71	6.00	6.85	7.00	8.00
Addition										
Hoquiam, Wash.	11.6		13.6		15.5		16.2		16.9	17.8
Duluth, Minn.	9.5		12.0		14.1		15.7			
Denver, Colo.	9.8		13.2		12.0		14.5		15.6	15.7
Seattle, Wash.					15.0		16.2		16.6	17.4
Norfolk, Va.	9.7		10.5		13.8		15.7		15.1	
Richmond, Va.		8.2		12.1		14.2		15.5		14.5
Lynchburg, Va.		11.4		11.3		14.5		15.6		16.3
Roanoke, Va.		9.4		13.0		14.4		15.0		16.1
Danville, Va.		11.9		13.5		13.8		14.3		16.0
Subtraction										
Hoquiam, Wash.	9.3		10.2		11.8		13.8		14.7	15.0
Duluth, Minn.	6.0		9.4		11.5		13.4			
Denver, Colo.	7.0		10.0		10.6		11.0		13.5	14.5
Seattle, Wash.					11.6		13.0		13.3	14.2
Norfolk, Va.	6.5		9.8		10.8				11.9	
Richmond, Va.		6.7		9.5		12.0		13.3		13.5
Newport News, Va.		8.0		10.2						11.6
Lynchburg, Va.		9.0		10.0		11.2		12.6		13.4
Charlottesville, Va.		7.5		8.6		11.4		12.5		16.0
Roanoke, Va.		8.0		9.4		11.8		13.1		14.6
Multiplication										
Hoquiam, Wash.	6.6		12.9		13.7		16.6		17.4	18.8
Duluth, Minn.	6.8		11.0		13.8		15.8			
Denver, Colo.	6.5		10.4		10.8		13.8		15.5	15.8
Seattle, Wash.							15.6		16.8	17.8
Norfolk, Va.	5.2		9.9		12.5		13.1		13.5	
Richmond, Va.		7.6		10.3		13.2		15.3		17.2
Roanoke, Va.		7.7		8.7		11.1		13.4		11.3
Harrisonburg, Va.	8.7		11.2		14.9		16.5		17.0	18.4
Portsmouth, Va.		8.6		10.7		14.1		15.6		16.9
Division										
Hoquiam, Wash.	7.8		9.6		10.4		12.0		13.1	13.8
Duluth, Minn.	4.6		7.2		9.2		11.1			
Denver, Colo.	4.5		6.4		6.5		9.2		11.5	12.0
Seattle, Wash.					9.8		11.1		12.0	13.0
Norfolk, Va.			5.6		9.5		10.8		11.2	
Richmond, Va.		4.5		6.9		9.5		10.7		11.5
Harrisonburg, Va.	4.6		6.9		10.7		12.6		12.0	13.8
Portsmouth, Va.				5.6		9.0		11.6		13.9
Dansville, Va.		4.6		6.0		9.3				

CHAPTER VI

HANDWRITING

THE main purpose of this chapter will be to show how effectively the children in the public elementary schools of Virginia are taught to write. Measurements of handwriting will be reported for various types of Virginia schools, first, in comparison with each other, and, secondly, in comparison with schools outside the state. Data will be provided to indicate not only whether these various types of schools are producing results up to standard, but also how far below or above standard the achievement is.

In the Virginia Survey it was decided to employ the "free-choice" method of testing handwriting, the method used by most of the investigators who have given us important standards. By this method the two important aspects of handwriting, quality and rate, are carefully provided for; the pupil is permitted to establish his own balance between quality and rate; the time is limited to some short period like two minutes, and a copy is written that is, or should be, perfectly familiar to the pupils. The details of application of the method are shown in the "Directions for Administering the Test," which follow.

DIRECTIONS FOR ADMINISTERING THE TEST

1. Say to the pupils: *"Our second test will be a handwriting test."*
2. In grades where the pupils have written with pen and ink for at least one half year, arrange to have writing done with pen and ink. Elsewhere have writing done with pencil.
3. Provide pens from the examiner's supply.
4. Do not permit the use of fountain pens.
5. See that each pupil has ink.
6. Do not distribute any blotters until the test is completed, and then only in exceptional cases to save time waiting for samples to dry. After the signal to stop has been given, ask pupils to rise for a moment until the ink on their papers

dries. Where occasional blotters are used, caution the pupils about care in their use.

7. Proceed to have all pupils memorize the copy to be written, which is printed under the heading "Handwriting" on the front page of the booklet:

"The land of the free and the home of the brave."

8. Conduct the memorizing process as follows:

"Below the word 'Handwriting' on the front of your book you will see something printed. You read it silently while I read it aloud: 'The land of the free and the home of the brave.' This is the copy that we are going to write. Listen while I say it again: 'The land of the free and the home of the brave.' Say it for me, all together, without looking at the paper. (Pause.) *Say it again.* (Pause.) *Now do you think you can write this without looking at the copy? I think you can."*

9. From this point continue as follows:

"We wish to get a sample of your writing. We want to see both how WELL *you can write and how* FAST *you can write. So we want you to write just as well as you can and just as fast as you can. After I tell you to start, you will write as many times as you can below the copy here* (pointing) *what we have just learned. After I tell you to start, write it all once, and then go on writing it until I tell you to stop. When I say* 'Go,' *I want you to start writing. When I say* 'STOP' *all stop at once and quietly rise.*

"See that your book is in position, and that you have ink on your pen. Remember, FAST *work and* GOOD *work.*

"READY! Go!"

10. Allow precisely TWO MINUTES, and then say "STOP."

Be careful to see that all the pupils stop promptly at the signal.

11. Have monitors collect papers after the ink is dry on all of them.

The writing of the pupils was done on uniform ruled paper provided by the survey staff, and, as a precaution against lapses of memory on the part of the pupils, the copy, as

described in the test directions, was printed at the top of each sheet.

SCORING THE SAMPLES

Because of the evident care with which the numerical values of the scale samples were determined, the use of an identical copy for all qualities and the general convenience of its arrangement, the *Measuring Scale for Handwriting* by Dr. Daniel Starch was employed in the scoring of the samples. This choice of scale was made despite the unfortunate content of the copy used on the Starch scale. It would seem, considering the general educational program of adjusting instruction to the maturity levels of pupils, that one might select something more appropriate in content and spelling for third-graders to write than "achieving success" and "gaining the respect of intelligent men."

The plan of scoring handwriting naturally was made to conform to certain general policies of the survey staff. Among these was the policy of so conducting the division of tests and measurements that it would leave in the state a larger body of persons practiced in the technique of measurement after the work of the division was completed. To this end the scoring was done at seven different educational institutions in the state. The plan adopted for the scoring at these centers is given below:

SELECTING AND TRAINING THE SCORER

1. Employ not more than one scorer at each scoring center.
2. Select and train the scorer by the following method:

(*a*) Choose 100 papers at random from grades three to seven inclusive.

(*b*) Number these papers from 1 to 100.

(*c*) Use Starch's *Measuring Scale for Handwriting* for the scoring.

(*d*) Employ sorting method in the scoring; that is, "The scorer sorts into separate piles all of the papers to be rated, putting into one pile those which he judges to be of quality 2, and so on for all of the different qualities. He then care-

fully compares all of the papers in each pile with each other and with the samples of that value reproduced on the scale, so as to make sure that he has not included in the pile any samples that might more justly be assigned to the next higher or lower piles." A paper is scored as of a given scale quality if it is *as good as* that quality, but not so good as the next higher quality.

(*e*) Do not score in fractional values.

(*f*) Have these papers scored independently by each of five persons, — better, ten.

(*g*) Provide each person scoring with individual score sheet prepared as follows:

Sample	Score	Sample	Score	Sample	Score

(*h*) Assign each scorer a letter and request him to place it instead of his name on his score sheet.

(*i*) Tabulate the results for the various samples as follows:

	Scores										Deviations									
Sample	A	B	C	D	E	F	G	H	I	J	Ave.	A	B	C	D	E	F	G	H	I	J
Average deviations for 100 samples																					

(*j*) Select for further training on the same samples the individual who makes in the first scoring of the 100 samples the smallest average deviation or error, that is, variation from the average, which is assumed to be the true value of the sample. To obtain this value for each scorer, average the several columns, A, B, C, etc., under "Deviations."

(*k*) Continue this training by repeated independent scorings of the same samples until the scorer's average deviation drops below .5, or one half step, on the Starch scale. This may require five or six scorings of the 100 samples.

4. Check the work of the scorer occasionally after he has begun the regular scoring by having him rescore the 100 evaluated samples, computing each time his average deviation.

5. Preserve complete data on the reliability of the scorer and transmit same to central office.

It might be urged, in objection to the above plan, that the function of the division of tests and measurements was measurement, not instruction, and that one capable and carefully trained individual should have scored all the samples in the survey. If it had been part of the plan of the staff to make comparisons between different cities, counties, or other like groups, the objection would be in some degree relevant, for the papers from different geographic units often had different scorers. But since the central interest of the division was to determine the state-wide levels of achievement in different types of schools, and the same scorer participated in the scoring of the samples from various types in each geographic unit, the objection is not a serious one.

STANDING OF VARIOUS TYPES OF SCHOOLS

An endeavor has been made to assemble in compact form in Tables 37 and 38 the essential results from the city schools and from the four types of rural schools, white and colored. These types are the one-room, two-room, three-room, and four-room-and-over non-city schools. For each type is given by grades the median quality of handwriting in terms of units on the Starch scale and the median rate in terms of the number of letters written per minute. In the lower portion of the table are presented the following data for comparative purposes: the Freeman standards based on averages from fifty-six cities, the Starch standards based on measurements of six thousand pupils, and a set of measurements from the public schools of St. Louis.

Measures of Quality of Handwriting. One should be able

TABLE 37

Median quality of handwriting in various types of Virginia schools, compared with Freeman and Starch standards

Type of School	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
One-room	8.8	8.7	9.4	9.0	10.0	9.6	9.9	10.1	10.4	10.5
Two-room	9.0	8.5	9.8	9.0	10.1	9.1	10.6	9.9	11.3	10.0
Three-room	8.8	8.7	9.5	9.8	9.8	9.8	10.9	10.2	11.2	11.0
Four-room and over	9.3	9.0	9.5	9.6	10.0	9.7	10.5	9.9	11.0	10.1
Non-city average	9.2	8.7	9.6	9.3	10.0	9.5	10.5	9.9	11.0	10.1
City, first half year	9.8	9.6	9.5	10.2	9.9	10.6	10.4	11.0	10.6	12.5
second half year	9.5	9.6	9.4	10.3	10.2	11.2	10.4	10.8	11.5	12.3
VIRGINIA GRADES	III		IV		V		VI		VII	

STANDARD GRADES	III	IV	V	VI	VII	VIII
Freeman standards	10.5	10.9	11.5	11.9	12.5	12.9
Starch standards	9.7	10.3	10.9	11.4	12.0	12.5
St. Louis medians	9.5	9.9	11.2	12.1	12.9	13.8

NOTE. Freeman standards in terms of units on the Starch scale. For values used in transmutation see Tables 40 and 41.

to obtain a clear idea of the situation in regard to handwriting in the rural schools by a study of the scores in the one-room and in four-room-and-over schools. The quality averages for these schools have been graphed and appear in the upper sections of Figure 2. The topmost oblique solid line in each section of the figure represents the Freeman standards. The solid line just beneath it represents the Starch standards.

In making comparisons with these standards, it should be noticed than an average year's improvement or growth is represented by about five tenths of a step. Also, greater dependence should be placed upon the measurements of the four-room-and-over schools than upon those for the one-room schools, since the values for the former are based upon much larger numbers of pupils.

Turning to the graphic representation of the quality of handwriting in the white four-room schools, one observes that above the third grade the pupils of these schools average two years below the Starch standards and about three years below the Freeman standards for the same nominal grade. This is the deficiency when quality of handwriting at the end of the common-school course in these schools is compared with the quality found at the end of the seventh grade in representative American city systems. When comparison is made in each case between pupils at the time of finishing the elementary-school course, the Virginia pupils are found to be three years below the lowest of the standards presented in the table and the graph, and, as would be expected, the one-room white schools make a still more unfavorable showing.

In the same two portions of Figure 3*a* are given the efficiency curves for quality of handwriting in the colored schools. There does not seem to be much difference in the showings for the two races in the one-room schools, though in making such a comparison the greater age and longer school stay of colored pupils should always be allowed for. Perhaps measurements of a larger number of pupils of each race in one-room schools would have produced a different result. At any rate, the measurements from the four-room-and-over schools, in which the number of pupils measured was larger than in the one-room schools, show decidedly different writing ability for the pupils of the two races. The white and colored four-room-and-over schools do not differ much up to the fourth grade, after which the colored schools gradually fall behind. At the end of the seventh grade this type of colored school is about two years behind the seventh grade of the corresponding white school, four years below the Starch standard, and five years below the Freeman standard.

The situation regarding the relative standings of white and colored rural schools is considerably clarified by Figure 3*b*, in which are shown the average results for the rural schools of each race, all four types being considered. The Freeman standards and those of Starch are again represented, and in addition a quality curve for the public schools of St. Louis.

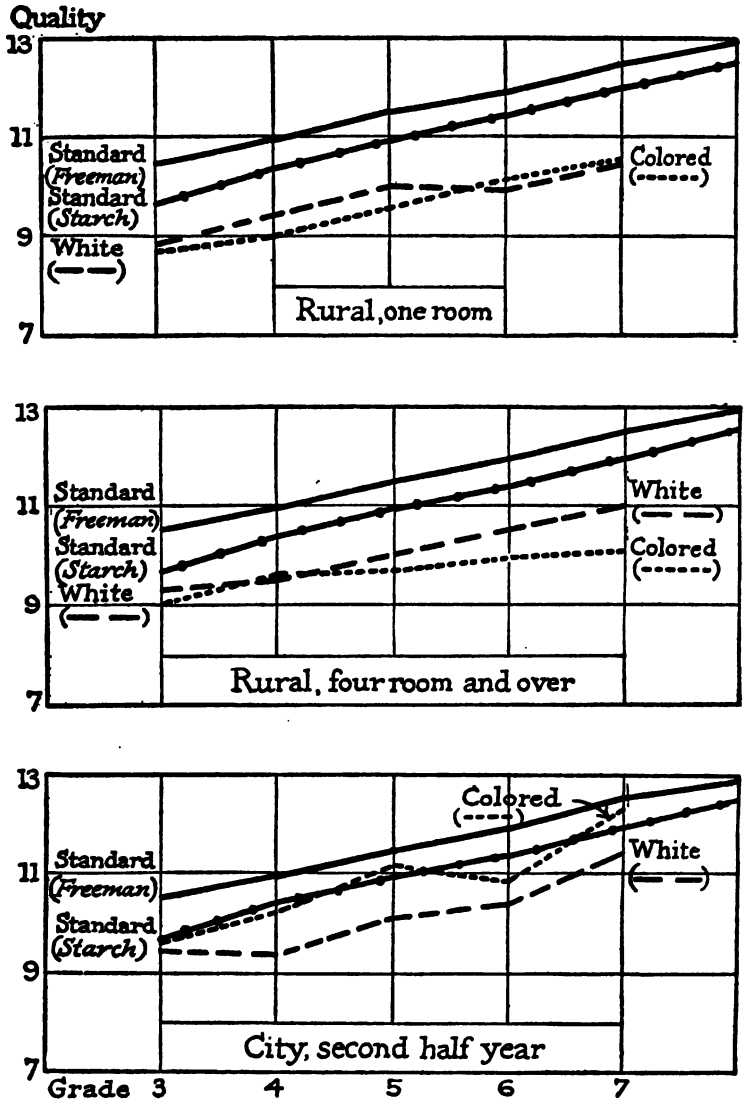


FIG. 3a. Quality of handwriting in rural and city schools, white and colored, grades 3–7. Data in Tables 37 and 38.

It will be noticed that in no grade from the third to the seventh do the colored rural schools equal the handwriting quality of the white rural schools, and at the end of the elementary-school course they are about as far below the white schools as the latter are below the lower of the two standards, which is about two years of standard progress in each case.

One expects large differences when comparisons are made between rural-school attainment and city-school standards. No one should expect rural schools in their present unorganized condition, in Virginia or elsewhere, to compete with city systems. We need similar results from rural schools in other states before a satisfactory judgment can be made concerning Virginia. Nevertheless, the state is here brought clearly face to face with the big problem of democracy in education. The nation cannot afford to send one half of its future citizens to such schools, as it is now doing, nor will our sturdy rural population suffer the continuance of such a policy, once their eyes are opened to the deplorable conditions and the better possibilities.

In the results from the cities of Virginia (see Table 37) there is a fairer basis of comparison with standards. The city white schools make a slightly better average showing than the rural white schools. They bring the pupils to the end of the elementary-school course a year's progress ahead of the rural product and only one year behind the Starch standard for the seventh grade. While this achievement does not approach what is being done in St. Louis, it does have a note of encouragement in it.

A rather surprising result, after the unfavorable showing in the rural schools, is that from the colored city schools. A glance at the lower section of Figure 3*a* indicates that these schools are up to the Starch standard. The curve for quality in these colored city schools is consistently above that for the white city schools in every grade from three to seven. Although the numbers of pupils measured in colored schools were not large enough to permit rigid or sweeping conclusions, the regularity with which the curve for the colored schools maintains its position above that for the white schools

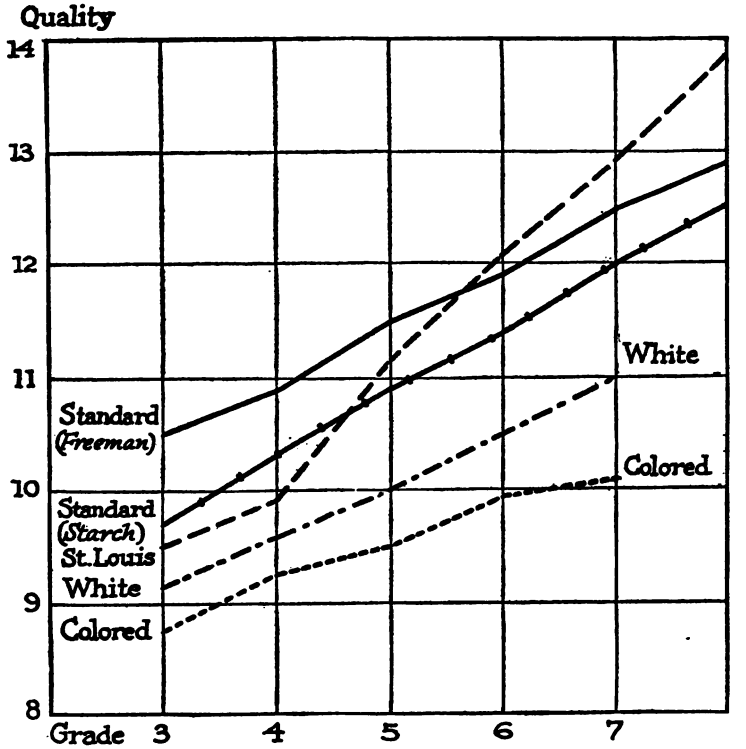


FIG. 3*b*. Average scores in quality of handwriting for rural schools, white and colored, grades 3–7. Data in Table 37.

suggests an important difference in the achievement of the two sets of schools. These colored schools average a year's progress better than the white throughout the grades tested, but again it should be remembered that on the average colored pupils, grade for grade, are about a year older and have attended school longer than white pupils in city elementary schools.[1]

Measures of Rate of Handwriting. When we have studied the quality of handwriting, we have studied only one of its two most important aspects. No measurement of the hand-

[1] Cf. Part 1, Table 21, p. 306.

writing product is complete without the inclusion of measures of rate. It is too well known that quality can be secured at the expense of rate, or *vice versa,* and that the teacher's and supervisor's achievement standards should comprise definite numerical values for each of these aspects.

The most casual examination of the rate figures of these Virginia tests will reveal the fact that the pupils wrote very rapidly, and that, in general, the white children wrote considerably more rapidly than the colored children. These results can be expressed more definitely by the use of the rate scores in Table 38. From a study of the average rates for the white rural schools, it is found that the pupils in these schools wrote, on an average, eighteen letters per minute above the Starch standards. Handwriting rate, investigations show, increases from grade to grade from six to nine letters per minute. This means that these rural white children throughout the grades had an average rate the equivalent of two years above standard. The excess in rate, it may be suggested, compensates for the deficiency in quality. It is not certain, however, that excess in rate is convertible on call into this quality equivalent. In general handwriting ability, therefore, the white rural schools are turning out a product at least a year's progress short of the Freeman standard and also a year short of our lowest accepted standard for the eighth grade in representative city schools.

The pupils in the colored rural schools maintained a rate of handwriting only slightly above the standard. Their average in excess of the standard, to be exact, was 3.6 letters per minute. On account of this fact and the above facts regarding rate in rural white schools, they must be assigned a relatively lower standing in comparison with the white rural schools than if their position had depended upon quality alone.

In the white city schools the pupils wrote, on an average, twenty-six letters above the Starch standards, that is, somewhat more rapidly than the children in the rural schools. At the end of the seventh grade they wrote ten letters above the standard for the eighth grade.

As in the rural schools, the colored children of the cities

TABLE 38

Median rate of handwriting in various types of Virginia schools, compared with Freeman and Starch standards

Type of School	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
One-room	45	39	55	53	68	56	68	(73)	76	(58)
Two-room	44	42	53	55	69	59	77	69	79	(85)
Three-room	48	51	62	53	72	59	79	(61)	83	(55)
Four-room and over	57	50	74	69	81	69	86	78	91	83
Non-city average	54	44	69	56	78	61	84	70	89	69
City, first half year	54	53	74	61	86	77	88	85	95	92
second half year	67	57	77	74	79	80	94	82	93	87
VIRGINIA GRADES	III		IV		V		VI		VII	

STANDARD GRADES	III	IV	V	VI	VII	VIII
Freeman standards	44	51	59	63	68	73
Starch standards	38	47	57	65	75	83
St. Louis medians	32	37	52	57	63	74

NOTE. Figures in parentheses are for too few cases to warrant reliability.

TABLE 39

The degree of individual differences in quality and rate of handwriting in rural and city white schools

Grade	Quartile Deviation				Coefficient of Variability			
	Rural		City		Rural		City	
	Quality	Rate	Quality	Rate	Quality	Rate	Quality	Rate
III	.8	14.4	.9	16.1	9	27	9	24
IV	.9	14.2	.9	14.8	9	21	10	19
V	.9	14.5	1.1	12.9	9	19	11	16
VI	1.1	13.3	1.1	13.5	10	16	11	14
VII	1.2	13.4	1.2	9.9	11	15	10	11
Unweighted Average	1.0	14.0	1.0	13.4	9.6	19.6	10.2	16.8

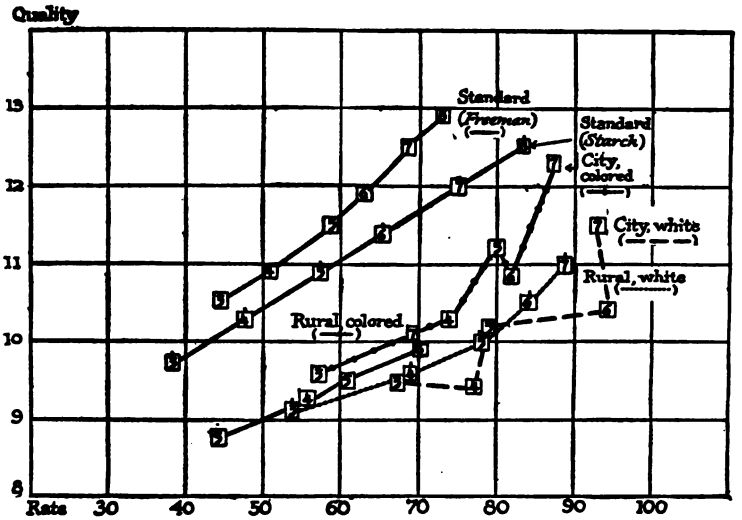


FIG. 4. Average rate and quality of handwriting, grades 3–7, for rural white, rural colored, city white, and city colored schools, together with Freeman and Starch standards.

wrote less rapidly than the white children, maintaining an average rate twenty letters above the standard. At the end of the elementary-school course these colored children were writing four letters above the standard rate for the eighth grade.

The general situation, so far as handwriting in the Virginia schools is concerned, is perhaps best revealed in Figure 4. Quality in Starch units is represented on the vertical scale of the graph, rate in letters per minute on the horizontal scale. The numbers in the smaller squares indicate grades. The position of each grade, it will be noticed, is determined by two numerical values, one for quality and the other for rate, taken from Tables 37 and 38. Averages for four types of schools are graphed: rural white, rural colored, city white, and city colored. For comparative purposes the corresponding standards are also placed in the figure.

Grade for grade, in comparison with the standards, it will be observed, the Virginia schools take a position farther to

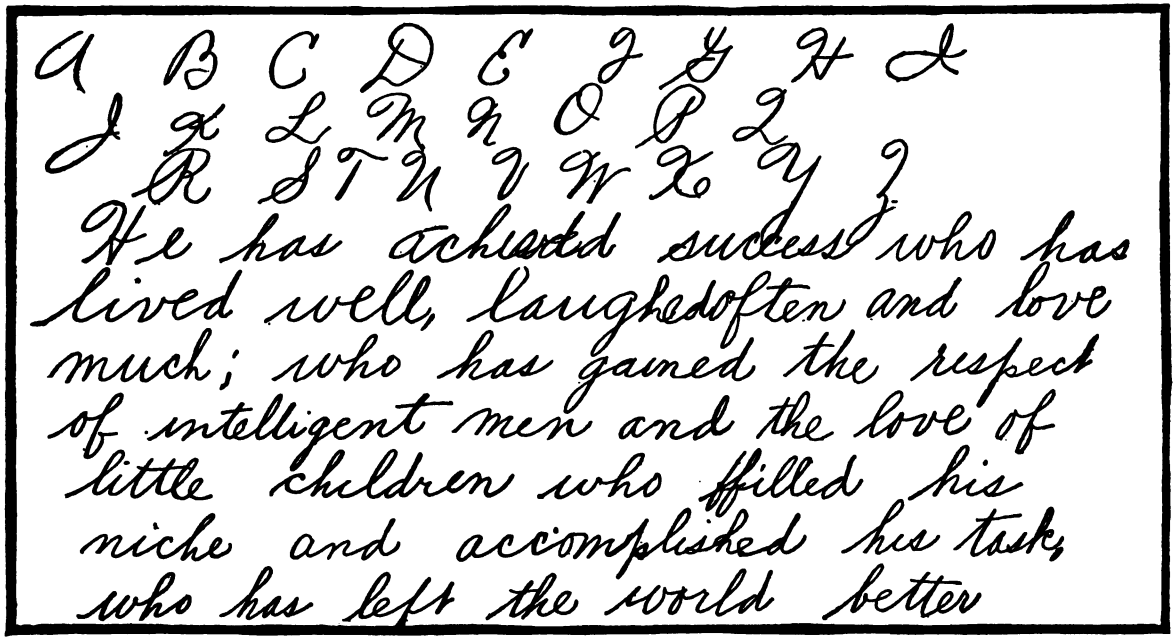


FIG. 5. A reproduction of the sample valued 11 on the Starch handwriting scale, the equivalent in quality of the average handwriting found in the white rural schools of Virginia at the end of the seventh grade.

the right in the figure, indicating, of course, their more rapid handwriting rate. The Virginia schools as a whole also take a lower position than that occupied by the standards, showing the inferior quality of the handwriting. It is evident from the graph that one of the most striking features of the handwriting represented is the lack of proper balance between quality and rate. One of the first steps in the supervision of handwriting in these schools should be the adoption of definite numerical standards for both quality and rate in each grade, and the use of these standards as aims in teaching as well as guides in measurement.

In order that the reader may be provided with a more concrete basis for the interpretation of the quality values referred to in this report, there is reproduced in Figure 5 the sample of handwriting on the Starch scale which has a value of 11. This is precisely the average quality attained at the end of the seventh grade in the white rural schools.

THE RELIABILITY OF THE RESULTS

When the general question of the reliability of the foregoing measures arises, certain more specific questions follow, such as:

(1) Was the test so designed and administered as to provide typical samples?

(2) Was the scoring accurate?

(3) Was the number of pupils tested in each case large enough to represent the type of school?

The manner in which the administration of the survey tests was provided for has been described elsewhere in this volume. The examiners were carefully selected and specifically trained.

As to the relation between the design of the test and the character of the samples secured, much might be said, but little can be said with certainty. From the fact that the rate of handwriting of so many schools, especially the white schools, was high in comparison with quality, regardless of variation in examiner, type of school, and the like, it might be inferred that the high rate was attributable to some char-

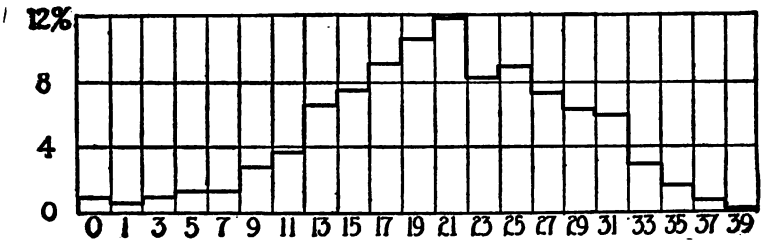


FIG. 10. Distribution scores for 1257 children, grades 3–8, in sentence reading test, Exercise 2, Delta 2.

bility. By this is meant that if the test were given again, certain pupils would be higher, others lower. This unreliability inheres also in teachers' judgments and, in a theoretical sense, in every measurement that can be made, whether that measurement be of physical phenomena or of human capacities. Science has found no way to eliminate this unreliability, but has devised ways of reducing it, of measuring it, and of compensating for its presence. In connection with the classification examinations used in the survey the fact of reliability must be carefully considered if our conclusions regarding overlapping and inaccurate classification are to be dependable. Unless this is done, we are in danger of interpreting as overlapping what is really a result of the unreliability of our tests. Dr. Kelley has shown that all published figures regarding overlapping of grades are incorrect because of a failure to take account of this fact of unreliability. In the case of a test with a coefficient of reliability of .25 an apparent overlapping of 33 per cent is reduced to 17 per cent when the unreliability of the test is considered.

The reliability or unreliability of an examination may be determined by repetition of the test. Obviously, a satisfactory test should give approximately the same result each time it is used in the measurement of the same thing. The score from a test which gives one result one day and a different result when the test is repeated, or when a similar test is given, is undependable. No important inference can be based from such a score, and no practical procedure can be based upon it, since a re-trial may invalidate such inference or procedure

altogether. The scores from a reliable test can be made the basis of practical administrative action with assurance of the outcome.

It is further desirable in this connection that the increase of score in the second trial shall not be too great, although a large increase of score may not invalidate the reliability of a test if all of the individuals taking the test increase their scores by the same relative amounts.

An important method for determining the reliability of the test is to repeat the test and to figure the coefficient of correlation between the results of the first and the results of the second trials. If this coefficient is high, it may be inferred that the test is reliable, and that the score which an individual makes the first time is a fair index of what he will do on a second trial. In the following discussions the reliability of the tests will be expressed in terms of such coefficient of correlation.

3. *Significance.* It is possible that an examination may have satisfactory discriminative capacity and satisfactory reliability, and yet be unsatisfactory as a standard examination, because the results of the test have no significance. Thus it has been found that the so-called "cancellation tests" give no results that are worth while. The ability to cancel figures or letters is not in itself of any importance, and success in this activity does not indicate the possession of any other desirable trait. On the other hand, a high score in an *opposites* test indicates the possession of other important mental abilities. To be significant an examination must have a content which is in itself a desirable possession for an individual, or success in the examination must give a dependable basis for inferring the possession of desirable traits. Thus, from the score which a pupil makes in an intelligence test it should be possible to infer that pupil's capacity to do school work. Or to state another case, it should be possible by measuring reading achievement of sixth-grade pupils to determine whether or not such pupils can do the reading work required in the seventh-grade school program. The statistical method for determining the significance of a test is that of determining the coefficient of correlation between the test and other admittedly significant measures of capacity or achievement. If such co-

efficients are high, the test is in so far significant, but low coefficients of correlation indicate low significance or none.

4. *Norms for Comparison.* An examination which satisfactorily meets the above requirements, i.e., has discriminative capacity, high reliability, and definite significance, should also provide definite standards of comparison. That is, it is desirable that there be provided age or grade norms so that comparison of individual class scores will thereby be facilitated. It will now be our purpose to examine from the point of view of these desirable statistical criteria the several tests used in the survey for the measurement of the classification of students.

INTELLIGENCE EXAMINATION DELTA 2 [1]

The general intelligence examination, Delta 2, is a modification and adaptation of the Army intelligence examinations. It comprises the arithmetical problems, synonym-antonym, practical judgment, and information tests of the army Alpha examinations, the picture-completion test of the Beta group, and the sentence reading tests, sometimes called the "Devens Literacy" test. The several tests chosen were modified by a selection of the items best adapted for the grades to be tested and by the addition of similar items. The six tests thus adapted were printed as a single booklet. The directions for giving the test are simple; the time for the entire test is short, twenty-one minutes net time, and the scoring is entirely objective. This test was used generally throughout the survey, being given to practically all the intermediate and upper-grade children who were tested by achievement examinations.

DISCRIMINATIVE CAPACITY OF INTELLIGENCE EXAMINATION, DELTA 2

The discriminative capacity of the general intelligence examination, Delta 2, will be evident from Table 52 and from

[1] With slight revision, this test is republished by the World Book Company, Yonkers-on-Hudson, New York. It was originally designated Delta 1 and was so designated in Part 1 of *Virginia Public Schools.*

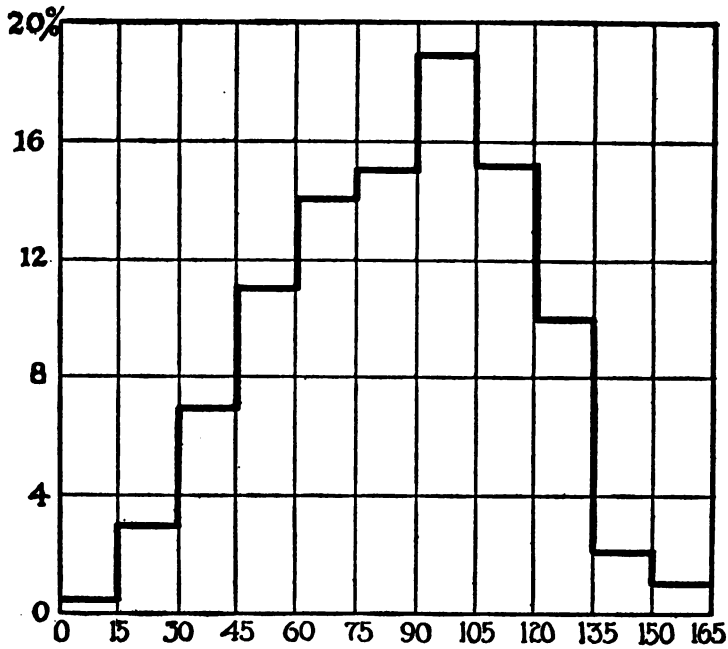


FIG. 11.

Figure 11. The data for this table were obtained from tests on 2323 pupils in grades three to eight in the cities named at the head of the table. First it should be noted that there is a definite step up for each half grade from lower third to upper eighth. The average amount per grade is sixteen points, with the greatest increase, 23.1 points, from grade three to grade four, and the least increase, 8.3 points, from grade seven to grade eight. The table shows a somewhat curious congestion of inferior individuals in the lower fifth grade, although the upper fifth grade assumes its proper place between upper fourth and upper sixth; second, the median deviation of the examination is fairly low, never greater than the inter-grade interval; third, the examination even in the low third grade gives no zero scores, the lowest score for any pupil falling in the 5–9 step; fourth, there are no perfect scores even in the

TABLE 52

General Intelligence Examination Delta 2. Distribution and median scores by half grades for grades three to eight inclusive for the following cities: Aberdeen, Baltimore, Cleveland, Evansville, Indianapolis, Louisville, Rochester, Santa Anna; 2323 pupils.

	Grades											
	3		4		5		6		7		8	
	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half
160–164	....	....	....	....	....	....	....	....	.....	.....	1	.....
155–159	....	....	....	....	....	....	....	....	.....	.....	.....	2
150–154	....	....	....	....	....	....	....	....	.....	.....	.....	.....
145–149	....	....	....	....	1	....	1	....	2	2	2	4
140–144	....	....	....	....	....	....	....	2	5	3	7	6
135–139	....	....	....	....	....	1	2	....	8	6	2	8
130–134	....	....	....	....	....	1	8	12	11	19	11	12
125–129	....	....	....	....	....	....	3	5	19	14	9	13
120–124	....	....	....	....	4	4	10	13	25	18	9	**19**
115–119	....	....	....	....	....	2	10	13	23	23	**11**	15
110–114	....	....	....	1	2	5	16	18	37	**21**	6	14
105–109	....	....	....	....	1	14	23	35	**39**	17	10	9
100–104	....	1	....	....	1	12	29	36	31	22	5	1
95–99	....	....	....	4	8	24	25	**29**	37	11	7	4
90–94	....	....	2	3	5	29	**42**	32	27	11	8	5
85–89	....	1	....	11	5	20	30	22	17	3	.....	2
80–84	....	....	1	10	11	34	25	28	9	4	2	2
75–79	....	1	1	11	16	**30**	20	21	11	7	1	1
70–74	1	4	4	15	26	30	16	20	5	1	1	.....
65–69	..	7	9	21	22	29	12	13	4	1	.....	.....
60–64	1	....	14	**15**	**27**	18	15	4	3	.....	1	.....
55–59	4	6	12	19	22	15	7	5	3	1	.....	.....
50–54	5	12	**16**	20	29	13	1	....	3	.....	.....	.....
45–49	6	16	13	8	15	5	5	1	1	.....	.....	.....
40–44	8	**12**	7	5	12	7	4	....	.....	.....	.....	.....
35–39	**7**	14	11	8	14	7	....	....	.....	.....	.....	.....
30–34	12	17	6	2	9	1	....	....	.....	.....	.....	.....
25–29	10	15	8	2	8	....	....	....	.....	.....	.....	.....
20–24	6	9	1	....	1	3	....	....	.....	.....	.....	.....
15–19	....	4	1	1	1	....	....	....	.....	.....	.....	.....
10–14	3	2	1	....	1	....	....	....	.....	.....	.....	.....
5–9	....	2	....	1	1	....	....	....	.....	.....	.....	.....
Total..	63	123	107	157	242	304	304	309	320	184	93	117
Median	35.4	41.2	51.8	64.3	63.3	78.0	92.3	96.5	105.3	113.3	117.2	121.6

NOTE. Figures in heavy type indicate the groups in which the respective medians lie.

highest group. The best pupil scored less than 165, whereas the highest possible score in the test is 176. The examination, therefore, seems sufficient to discriminate the individuals within each of the half-grade groups, to measure the weakest and strongest pupils within each such group, and to discriminate each half-grade group from the one next above.

RELIABILITY OF THE GENERAL INTELLIGENCE EXAMINATION, DELTA 2

The general intelligence examination, Delta 2, has distinctly high reliability. The evidence for this comes from various experiments with the individual tests of which the Delta 2 examination is composed. Each of these separate tests, either in the same or closely related forms, has been widely used. All of the tests are to be found in the Army examinations, and experience with them in this connection shows a relatively high coefficient of reliability. Each of these tests was also used in a preliminary form in the course of the preparation of the National Intelligence Tests.[1] Each of the tests showed in this preliminary work coefficients of correlation ranging from .61 to .88.

The best evidence, however, of the reliability of the Delta 2 examination was obtained by a repetition of the entire test in one school. In this school 129 children in grades three to six inclusive were tested about 10 o'clock in the morning; about 2 o'clock in the afternoon of the same day, the same children were given the same test. In the second trial the children gained on an average twelve points, and the coefficient of correlation between the scores of the two trials was .90 ± .01. The several tests showed coefficients of correlation ranging from .71 to .86.

It may be inferred from these data that the original scores represented with fair reliability whatever traits the Delta 2 examination measures.

[1] The National Intelligence Tests were prepared under the auspices of the National Research Council by M. E. Haggerty, L. M. Terman, E. L. Thorndike, G. M. Whipple, and R. M. Yerkes, and were published by the World Book Company.

TABLE 53

Correlation of mental and educational tests and criterion. One hundred eleven-year-old white pupils in Richmond city (actual ages 10 years 7 months to 11 years 6 months). Criterion = four times grade location plus teacher's rating for intelligence

Measures		Criterion	Delta 2	Addition Woody	Reading Thorndike	Writing Starch	Spelling Ayres	Years in School
Criterion	r =	...	.77	.73	.61	.42	.55	...
	P. E. = ±	...	.03	.05	.05	.06	.05	...
Delta 2	r =	.77	...	.70	.64	.38	.37	.23
	P. E. = ±	.03	...	.04	.04	.06	.06	...
Addition Woody	r =	.73	.70	...	.47	.42	.54	.42
	P. E. = ±	.05	.04	...	.05	.06	.06	.06
Reading Thorndike	r =	.61	.64	.47	...	.33	.41	.08
	P. E. = ±	.05	.04	.05	...	.06	.06	...
Handwriting Starch	r =	.42	.38	.42	.33	...	.60	.37
	P. E. = ±	.11	.06	.06	.06	...	.04	.06
Spelling Ayres	r =	.55*	.37	.54	.41	.60	...	.04
	P. E. = ±	.05	.06	.05	.06	.04	...	...
Years in school	r =	...	.23	.42	.08	.37	.04	...
	P. E. = ±	...	.06	.06	...	.06	...	...
Delta 2, addition, reading, spelling, and writing combined	r =	.78	...	...	...	...	...	...
	P. E. = ±	.03	...	...	...	...	...	...
Names of pupils listed alphabetically	r =	.13	...	...	...	...	...	...
	P. E. = ±	.07	...	...	...	...	...	...

* .63 with 20-word list.

THE SIGNIFICANCE OF INTELLIGENCE EXAMINATION, DELTA 2

In an attempt to determine the significance of the intelligence examination, Delta 2, special studies have been made of the results of the test with several groups of Virginia children. One such group consists of 100 eleven-year-olds (10 years, 7 months to 11 years, 6 months) chosen from among those tested in the city of Richmond. This included all the children within these ages from certain schools for whom all the needed data were available, and there is thus good reason to think of the group as a fairly unselected one. How nearly the 100 cases approximated a normal eleven-year-old group may be observed in Figure 12, which shows their distribution in the intelligence examination, Delta 2. The records of this group give the best available basis for the proper evaluation of the significance of the tests. The specific problem is to determine which of the several tests used gives the best coefficient of correlation with the ability of these 100 eleven-year-olds to do school work.

A number of measures other than the Delta 2 examination are available for correlation purposes, including the scores from the several achievement tests and the coefficients for the several correlations in the case of the 100 eleven-year-olds (see Table 53). Probably the most significant of the coefficients of correlation shown in this table are those of the several tests with the criterion. The basis of this criterion is the grade location of the pupils. This basic criterion was chosen, since it is probably the best single measure against which to check the results of classification tests. It is recognized that the grade reached in school is not an accurate measure of a pupil's ability. Some pupils are in grades higher than their abilities warrant; others have ability to do more advanced work than their grade location calls for. Despite all such irregularities, however, the grade location of any pupil represents the comprehensive judgment of all his past teachers, of his present teacher, and of all other school officers as to his ability to do the school work. Because of the

composite character of this judgment it should have greater weight than the judgment of any single teacher in making up a reliable criterion against which to measure the discriminative value of any test or scale. How much greater weight should be given to it, is not clear. It is probable that its relative value increases from the lower grades to the higher, i.e., if the grade location is twice as important as the teacher's judgment of the pupil's ability in the second grade, it may be seven or ten or fourteen times as important in the seventh grade.

In preliminary work several weightings were tried, but in the main, dependence has been put upon a criterion made by multiplying the grade location by 4 or 5 and adding to this product the teacher's rating for intelligence. Thus a child in low fourth grade would have a criterion score of 16 (4×4) or 20 (4×5), plus the teacher's rating. The teacher's rating given in the letters A, B, C, D, E was equated in value to the figures 5, 4, 3, 2, 1, respectively. If the above fourth-grade child were rated A his criterion score of 16 would be raised to 21 ($16 + 5$) or 25 ($20 + 5$). Similarly, a child in the upper fifth grade ($5\frac{1}{2}$) rated B in intelligence would have a criterion score of 26 ($5\frac{1}{2} \times 4 + 4$), and so on for the other grades and for other intelligence ratings. For most of the correlations reported in this chapter the criterion of four times the grade location plus the teachers' rating for intelligence was used. Where other criteria were used, special note will be made.

RELATIVE VALUE OF CLASSIFICATION MEASURES

If we may assume that a criterion so composed is a valid measure of classification tests, we shall be able to determine the relative usefulness of such tests by figuring the coefficient of correlation of each test with the criterion. Such coefficients are given in Table 53, and judged by this measure, the several available means of classification for the 100 eleven-year-olds would be valuable in about the order indicated below ((*a*) is the best measure, (*b*) is the second best, etc.):

(*a*) General Intelligence Examination, Delta 2;
(*b*) Woody Arithmetic Scale (addition);

TABLE 54

General Intelligence Examination Delta 2; 300 cases. Showing the percentage distribution of scores in the Richmond city schools

Score	Percentage	Score	Percentage
145–149	.33	70–74	4.66
140–144	.33	65–69	4.66
135–139	....	60–64	3.66
130–134	2.66	55–59	2.66
125–129	1.66	50–54	5.33
120–124	2.33	45–49	3.33
115–119	2.64	40–44	7.00
110–114	2.33	35–39	7.00
105–109	5.00	30–34	3.66
100–104	4.00	25–29	2.00
95–99	6.33	20–24	1.66
90–94	7.33	15–19	2.00
85–89	6.33	10–14	....
80–84	4.33	5–9	.33
75–79	6.00	0–4	....

(*c*) Scores in Spelling;
(*d*) Thorndike Reading, Alpha 2;
(*e*) Teachers' Rating for Intelligence;
(*f*) Ability in Handwriting;
(*g*) Years Spent in School;
(*h*) Alphabetical Arrangement of Names.

Figures 12 to 20 picture certain of these correlations so that their meanings may be more obvious than are the tabular data.

Before considering the correlations for the 100 eleven-year-olds, it will be instructive to study Figure 12, which pictures the relation between the criterion (four times the grade location plus the teachers' rating for intelligence) and the scores in the general intelligence examination, Delta 2, for 300 pupils in grades three to seven of the Richmond schools. These 300 cases were obtained by selecting at random whole classes from three schools in Richmond — the Fairmount School, Grace Arents School and the Ginter Park School. Approximately the same number of classes were chosen from each of the five grades. The distribution of the 300 pupils in Delta 2 is shown in Table 54.

In Figure 13 the numbers along the base line represent

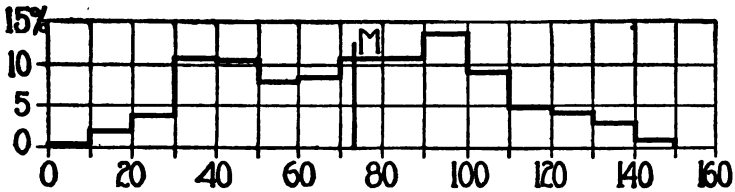


FIG. 12. General intelligence examination, Delta 2. Distribution of 100 eleven-year-old children (Richmond).

the criterion score. Thus, 18 means 4 × 4 plus 2 (D rating for intelligence) or 4 × 3½ plus 4 (B rating for intelligence). The heavy horizontal line across the middle of the figure indicates the median score (76) in the intelligence examination, Delta 2. The horizontal line next above (+1Q) is placed at a distance from the median, which is equivalent to the semi-interquartile range (Q) of the scores in the Delta 2 examination.[1] The second horizontal line (+2Q) above the median is placed at twice the distance of the semi-interquartile range above the median. Similarly, +3Q represents three times this measure of variation. In like manner the horizontal lines −1Q, −2Q, and −3Q represent corresponding distances below the median.

The heavy vertical line (M) represents the median criterion score (24). The lines +1Q, +2Q, and +3Q represent distances above the median of the criterion score equivalent to one, two, and three times the semi-interquartile range (Q) of the criterion scores of the 300 children. The vertical lines −1Q, −2Q, and −3Q represent similar distances below this same median.

Each dot on the figure represents an individual child; the location of the dot indicates both criterion score and intelligence score of the child. To illustrate: the lowest dot on line 14 (4 × 4 + 2) represents a pupil whose score in the Delta 2 examination was a little less than 20; another child with the criterion score of 14 had a Delta score of 32. If

[1] The semi-interquartile range is a convenient and easily calculated measure of deviation, and in general has much the same significance as average deviation (AD), median deviation (MD), standard deviation (SD), terms which may be more familiar to the reader.

there existed a perfect relation in the increase of magnitude of the two measures — the intelligence examination, Delta 2, and criterion — the dots representing the 300 cases would arrange themselves diagonally from the lower left-hand corner of the figure to the upper right-hand corner.

The diagonal lines are drawn so as to include all those children who do not differ in their relative standing in one test from their relative standing in the other test by more than the semi-interquartile range of the test in question. Just what this means, may be made clear by some illustrations. Take the child represented by the dot at X; this child scored 100 in the Delta 2 examination, which score was just the difference of the quartile above the median of his group. His dot is therefore to be found on the line representing this quartile measure. In like manner the criterion score of this child was 29, which is just the distance of the quartile above the median criterion score.

The pupil indicated by the dot X′ is a child who had a criterion score of 32, or twice the quartile above the median, and an intelligence score of 123, which is twice the quartile above the median of that measure. Correspondingly, that dot occurs at the intersection of the two +2Q lines. These two pupils, X and X′, therefore, differ from the median of one test in exactly the same amount in which they differ from the median of the other measure.

Let us take now a different case. Take the child represented by dot X. This child differs from the median of the intelligence score 1Q distance, but he differs not at all from the median of the criterion score. But the difference in his variation from the medians of the two tests is not greater than 1Q of the measure. The pupil represented by dot Y is a still different case. This pupil scored more than 1Q above the median of the Delta 2. His standing in the criterion score was below the median. The difference in relative position in the two tests was therefore greater than Q. This is true of all pupils represented by the dots which fall outside the diagonal lines. Further illustration may be seen in the case of two dots falling in the square bounded by the verticals +1Q and +2Q and the median horizontal line (M) and

the horizontal line —1Q. The two children represented by these dots have criterion scores that are relatively high (31). In the Delta 2 examination they make relatively low scores, 57 and 60, whereas each of them should have made approximately 110 to have merited his high standing in the criterion.

To generalize: All of the dots inclosed within the two diagonal lines represent children who do not differ in their relative standing in one test from their relative standing in another test by an amount greater than the semi-interquartile range in either test. The children represented by the dots outside the diagonal lines represent cases which do differ in one test from the median score in that test by an amount relatively larger than the variation which they achieve in the other test. To put it in another way: The dots within the diagonal lines represent children who are grouped in approximately the same manner by the two measures used. The dots outside the diagonal lines show children who are given relative standings by the two measures. The fact that relatively few dots are found outside the diagonal lines indicates that the scores in the two measures give approximately the same kind of classification.

When the test scores in two measures differ from their medians by approximately the same relative amounts, the correlation between the two tests will be high, and the correlation graph will appear like the one shown in Figure 12, in which a large percentage of the cases is inclosed within the two diagonal lines. The coefficient of correlation will in such case be high. In the case of data represented in Figure 12 the coefficient of correlation (Pearson) is .86 ± .01.

The form of representation used in Figure 12 is particularly valuable, because it enables one to give similar graphic representation to correlation arrays in which the units of measurement are unequal. By making the quartile of the test the unit of spatial representation, it is possible to make similar pictures of measures with unequal units, such measures, for instance, as the Woody scales in arithmetic, where the unit is the number of problems correctly solved, and the Thorndike reading scale, where the units are of an entirely different sort. Figures so drawn make the degree of correlation of each of

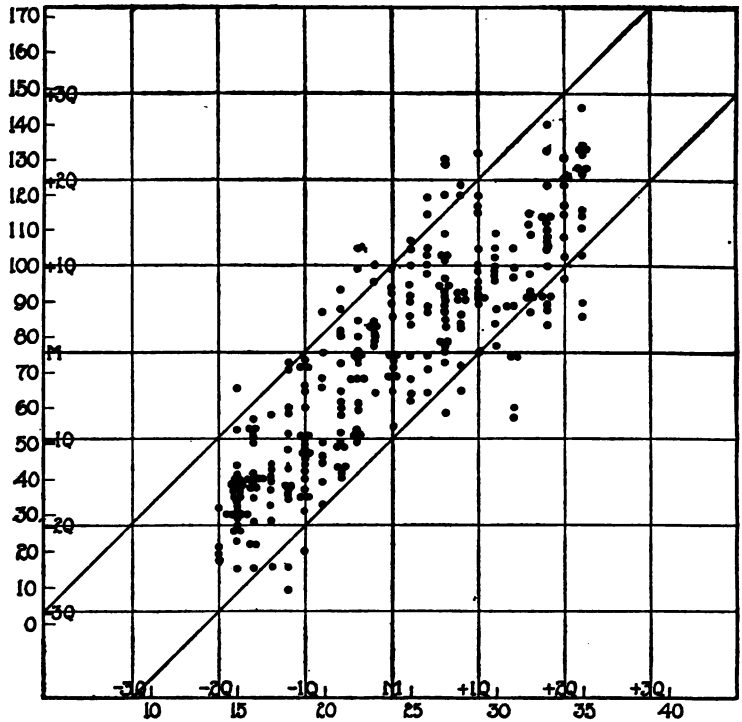


FIG. 13. Correlation graph showing relationship of scores in general intelligence examination Delta 2 and criterion (4 times grade location plus teachers' rating for intelligence); 300 children, grades 3 to 7, Richmond public schools. r equals .86, P. E. = .01.

the two measures with the criterion directly comparable to the eye. The amount of scatter shown on figures so drawn indicates the amount of correlation. Great scatter means low correlation, and the relative value of a test for purposes of classification may be inferred by the scatter. Obviously, the graphic representation adds nothing to what is evident to the initiated from the mathematical statement of the correlation. The graph merely visualizes the relation stated by the coefficient.

If the meaning of Figure 12 is clear, the significance of

TABLE 55

General Intelligence Examination Delta 2; 101 eleven-year-old pupils. Showing the distribution in the Richmond city schools according to their scores

Score	Number	Score	Number
120–124	1	60–64	5
115–119	1	55–59	1
110–114	..	50–54	5
105–109	1	45–49	22
100–104	1	40–44	7
95–99	2	35–39	..
90–94	1	30–34	5
85–89	7	25–29	5
80–84	9	20–24	1
75–79	8	15–19	3
70–74	6	10–14	..
65–69	8	5–9	1

Median 59.5

TABLE 56

One hundred eleven-year-old pupils (10 years 7 months to 11 years 6 months). Showing distribution by grade and years in school, Richmond city.

Grade	Years Spent in School							
	Less than 3	3	3.5	4	4.5	5	5.5	6
Third, lower	1	1	2	.....	3	.....	.....	.....
Third, upper	3	3	2	3	4	8	.....	.....
Fourth, lower	.....	.....	1	8	5	3	.....	1
Fourth, upper	.....	.....	.....	1	4	6	1	.....
Fifth, lower	.....	1	.....	2	7	7	2	1
Fifth, upper	2	.....	1	1	2	5	2	2
Sixth, lower	.....	1	.....	.....	1	3	.....	.....

the succeeding figures will be obvious. These figures represent the scores of the same 100 eleven-year-old pupils in a series of tests. The first figure of the series shows the data for the general intelligence examination, Delta 2. This is the best of all the available measures to show the capacity of these 100 pupils to do school work. The Pearson coefficient of correlation for the test with the criterion score is .771 ± .03.[1]

[1] This coefficient is lower than the coefficient for the same measures for the 300 cases shown in Figure 12, because the range of ability represented in the 100 eleven-year-olds is narrower. It means as great a relationship as does the larger correlation figure for the 300 cases.

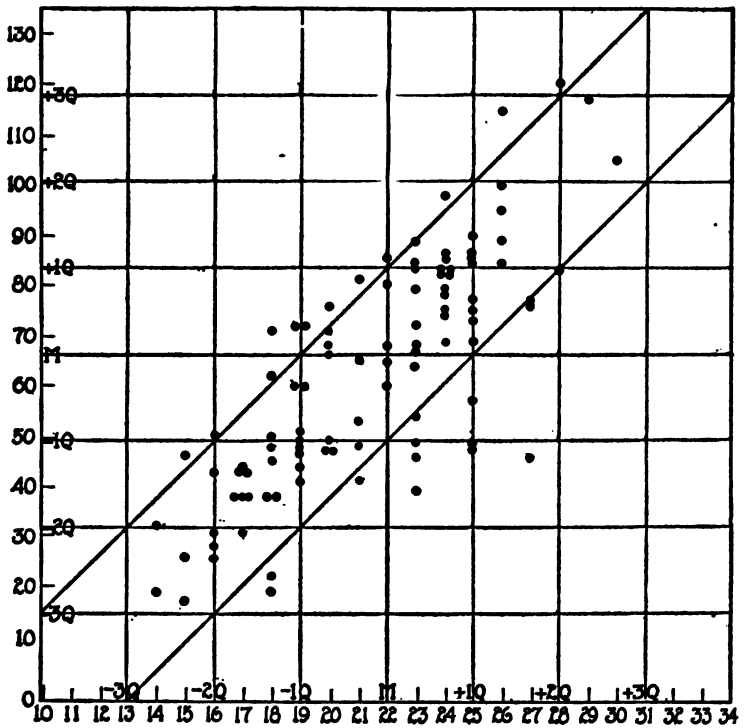


FIG. 14. Correlation graph showing relationship of scores in general intelligence examination, Delta 2, and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-old children (10 years, 7 months to 11 years, 6 months), Richmond public schools.

It is interesting to note that this correlation of .771 for the 100 eleven-year-olds for the Delta 2 examination and criterion score is changed almost not at all by the addition of any or all of the scores in the achievement tests to the Delta 2 scores. As a matter of fact, it rose from .771 to .778 when all these scores were included. This would indicate that the Delta 2 test when taken alone is practically as good a basis for classification of pupils as when combined with arithmetic, spelling, handwriting, and reading scores. The correlation was increased when the criterion score was modified by the

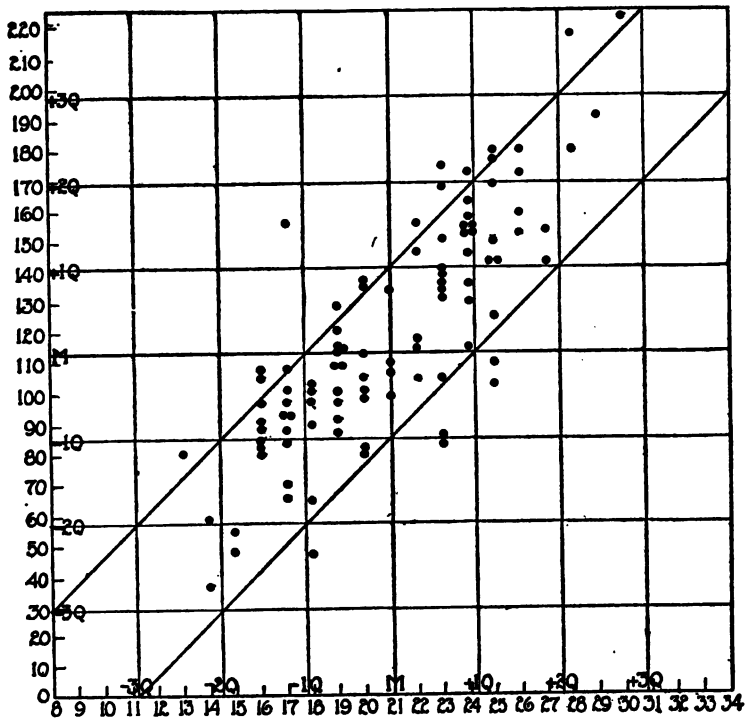


FIG. 15. Correlation graph showing relationship of scores in general intelligence examination, Delta 2, plus scores in Handwriting, Spelling, Addition, and Reading and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-old children (10 years, 7 months to 11 years, 6 months), Richmond public schools. r equals .78, P. E. .03.

addition of the Thorndike reading scores. The increase was slight, however, rising only from .771 to .784. Figure 15 shows but twenty-three dots lying outside the diagonal lines, and most of these are very near. Seventy-seven of the dots are inside the lines, and even within these lines there is noticeable a tendency to center along a narrow diagonal space.

Standing next to the general intelligence examination is the addition test of the Woody Series B. The coefficient of correlation (r) is .73 ± .03, although the reliability of the test (self-correlation on repeated trials) is considerably lower than

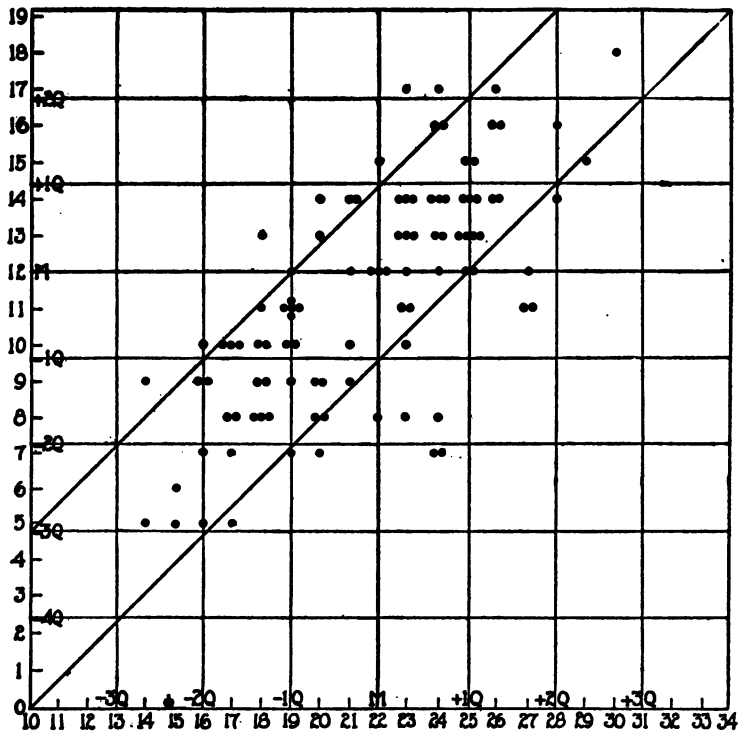


FIG. 16. Correlation graph showing relationship of scores in Woody Addition Scale, Series B, and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-olds (10 years, 7 months to 11 years, 6 months), Richmond public schools. r equals .55, P. E. .05.

that of the general intelligence examination. In the figure (Fig. 16) twenty-seven of the dots lie outside the diagonals, and both within and without the diagonals there is more tendency to irregular scatter than in the case of the intelligence examination. Of all the educational tests here considered, the addition tests seem to be the best basis of classification.[1]

[1]It should not be inferred that just any addition test is an equally good basis of classification. The conclusion stated above is relative only to this particular addition test and to the particular school grading of the Richmond schools.

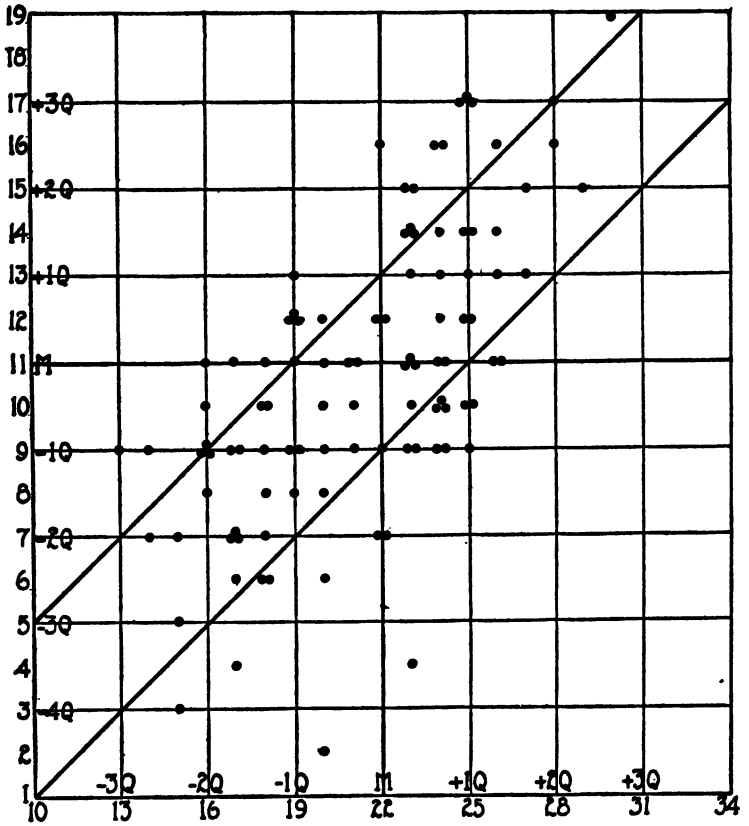


FIG. 17. Correlation graph showing relationship of scores in Spelling (Ayres Scale) and criterion (4G.L. plus T.R.I.); 100 eleven-year-old children (10–7 to 11–6), Richmond public schools. r equals .63, P. E.

The spelling test (twenty words) and the Thorndike Reading Scale Alpha 2 give somewhat lower correlations than does the addition test. (See Figures 17 and 18.) More than forty dots lie outside the diagonals in each of these figures, and the coefficients of correlation (Pearson: product moment method) for the two tests are .63 and .61 respectively.

This placing of the Thorndike reading test below the Woody scales is somewhat at variance with results obtained else-

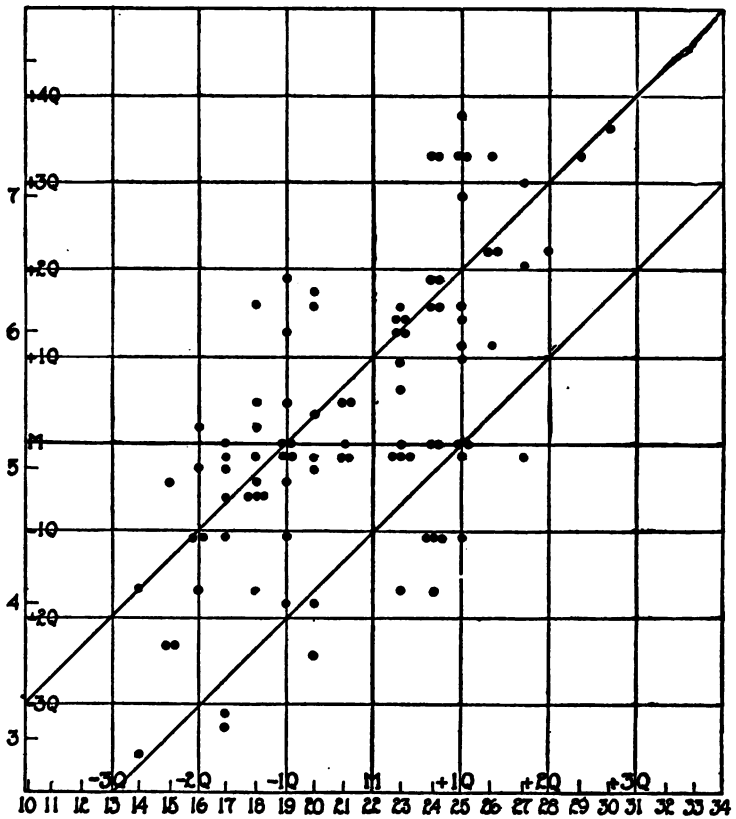


FIG. 18. Correlation graph showing relationship of scores in Thorndike Reading Scale, Alpha 2, and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-old children (10 years, 7 months to 11 years, 6 months), Richmond public schools.

where. It is probably due in the case of these Richmond children to the fact that computation is apparently stressed more than language abilities in the promotion of pupils.

Of considerably less value than the Thorndike reading scale is the quality of handwriting as measured by the Starch scale. The results, shown in Figure 19, afford a correlation of .42 ± .05, with forty-one cases outside the diagonals, fifty-

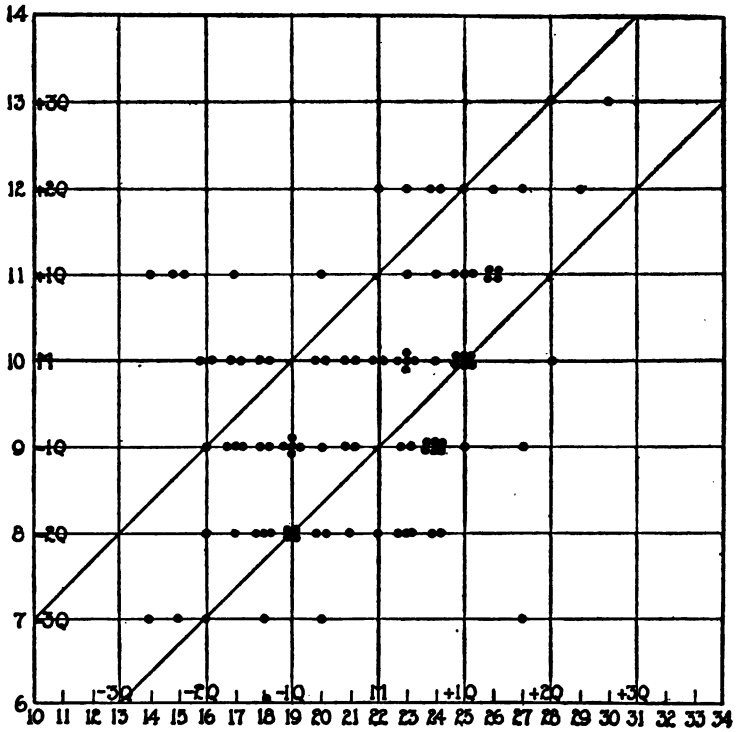


Fig. 19. Correlation graph showing relationship of scores in Quality of Handwriting (Starch Scale) and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-old children (10 years, 7 months to 11 years, 6 months), Richmond public schools.

nine cases being similarly classified by the two measures.

Somewhat less important are years spent in school and finally the alphabetical arrangement of names, which has no significance at all. Of course no one should expect any correlation between the grade location of pupils and the alphabetical arrangement of their names. Figure 20 is presented here to show a type of measure which gives no correlation at all and, secondly, to call this fact to the attention of those teachers and principals who occasionally section a class on the basis of the alphabetical arrangement of names.

EMPHASIS UPON ADDITION IN RICHMOND SCHOOLS

That addition stands so high as a measure of grade location shows how much this subject is emphasized in the Richmond schools as a basis for promotion. This conclusion, based on the survey tests, is confirmed by the results of the tests given in Richmond for the National Research Council. The latter tests, twenty in all, were given in the Horace Mann School in New York City and certain schools in Cleveland and California as well as in Richmond. The results show that the Richmond children excel in those tests involving computation, and that these tests are a better index of the grade location of the Richmond pupils than are the tests involving language. The reverse was true in the Horace Mann School and in Cleveland, where the distinctly linguistic tests showed the highest correlation with grade location. Dr. T. L. Kelley, in commenting on this situation after the most searching statistical treatment of the data, wrote as follows: "The essential difference seems to be that ability in computation is more highly credited in Richmond criteria, i.e., in the teachers' estimates and grade attained, than is the case in Horace Mann School, where linguistic and verbal analytic ability is more highly credited. Which of these is the more excellent standard will largely influence one's judgment as to the tests which should be selected."

In view of the importance of silent reading ability as a tool in acquiring an education, it is a very serious question whether or not it should not be given greater relative weight as a basis of grade promotion.

Viewing the series of correlation graphs, Figures 12 to 19, together, one sees the decreasing merit of the several tests as bases for the classification of children. The outstanding feature of the series is the clear superiority of the intelligence examination, Delta 2, as a basis for such grouping.

STANDARDS AND NORMS FOR INTELLIGENCE EXAMINATION, DELTA 2

In order to facilitate comparison of several groups of pupils, provisional standard grade and age scores were estab-

TABLE 57

Provisional standard scores in General Intelligence Examination Delta 2 for each grade, three to nine inclusive.

Grade.....	3	4	5	6	7	8	9
Score.....	40	60	78	96	110	120	130

TABLE 58

Provisional age norms in General Intelligence Examination Delta 2

Age in years.....	8	9	10	11	12	13	14	15
Score in points.....	25	43	55	66	77	87	100	115

lished. These grade scores, given in Table 57, were computed from the data for white children in Virginia cities and in the cities outside of Virginia. The age norms given in Table 58 were computed from the same data and as here printed are practically the medians of the several age groups.

There is an apparent discrepancy between the two tables, since the score for grade eight is 120 and the score for age fifteen is only 115. It may be observed that the average age of eighth-grade pupils is only fourteen and one half years, and hence it would seem that the grade score should be approximately 112 instead of 120 as given in the table. The explanation of this apparent discrepancy is that the eighth grade is not made up of an unselected group of fourteen-year-olds. The fourteen-year-olds in this grade are normal or supernormal children. These normal and supernormal pupils pull the grade score up above what an unselected group of fourteen-year-olds would make. The other pupils in the eighth grade are superior thirteen- and twelve-year-olds who have made rapid progress, pupils who always lift the grade score.

It may be further observed that an age once properly established upon the basis of adequate data will be a fairly constant affair. The grade score, on the other hand, will be

subject to administrative conditions. It will be lowered in a school where promotion is easy and dull pupils as well as good ones are promoted. It will be raised where promotion is rigid and only the best get through. Grading of the type represented by the standard scores in Table 57 evidently represents good school conditions.

The desirable statistical features of the test, therefore, may be summarized as great discriminative capacity, high reliability and significant correlation with other good measures of mental capacity and fairly accurate age and grade norms.

SECOND GRADE EXAMINATIONS

The results of the Delta 2 intelligence examination are available for grades three to seven and for the first year of high school. For grades one, two, and three we have the results of the intelligence examination, Delta 1, the reading examination, Sigma 1, and the Stanford revision of the Binet-Simon tests. A brief description of the Sigma 1 examination was given in Chapter IV. Our problem here is to apply to it the statistical criteria described on pages 115–119.

DISCRIMINATIVE CAPACITY OF READING EXAMINATION, SIGMA 1

In discriminative capacity the reading examination, Sigma 1, is practically as satisfactory as the intelligence examination, Delta 2, except for two points: the large number of zero scores in the first grade, and in the first half of the second grade, and second, the large median deviations (see Tables 20 and 21). The last, however, may not be so much due to the inadequacy of the tests as to the somewhat indiscriminate manner in which pupils of all sorts of ability are grouped together into the same grade. That the tests give distinct increase in scores for each succeeding half grade is obvious from the tables where the median groups are printed in heavy type. It is also clear that each of the two tests is sufficiently difficult to measure the superior individuals. In test 1, only eleven of the 1911 pupils, or one half of one per cent, make perfect scores. In test 2, twenty-two pupils,

or about one per cent of the entire group, make maximum scores.

RELIABILITY OF READING EXAMINATION, SIGMA 1

The reading examination, Sigma 1, is apparently as reliable as the intelligence examination, Delta 2. Test 2, in fact, is the same test as exercise 1 of the Delta 2 examination, which by itself shows a coefficient of reliability of .72. Test 1 of the reading examination shows a coefficient of correlation of .91 ± .01 (Pearson). This result was obtained where the test was repeated after about two months' interval. The obvious inference from these figures is that the two tests of the reading examination are each highly reliable measures.

SIGNIFICANCE OF THE READING EXAMINATION, SIGMA 1

While the Sigma 1 examination was constructed primarily as a test in silent reading achievement, the examination turns out to be a very excellent measure of intelligence also. As a measure against which to try out the examination for its value as a classification test, a criterion was made up from the grade location of the pupils, corrected by the teacher's rating for intelligence. This criterion was made up somewhat differently from the one described on pages 124–125 for the upper grades. The grade location, as in that case, was multiplied by four in order to weight the grade location heavily. This product was then modified by adding to it or subtracting from it, as the teacher's rating indicated high or low intelligence. Thus, if the teacher's rating was C, this was regarded as normal for the grade, and no addition or subtraction was made. For a B rating, however, one point was added to the product; for an A rating two points were added. Similarly, for a D rating, one was subtracted from the product, and for an E rating, two were subtracted. The final results obtained in this way were then used as a measure of the value of the tests with the criterion.

In the case of 144 eight-year-old children (7 years, 10 months to 8 years, 3 months) test 1 showed a coefficient of correlation with the criterion of .67 ± .036, Table 59. In the

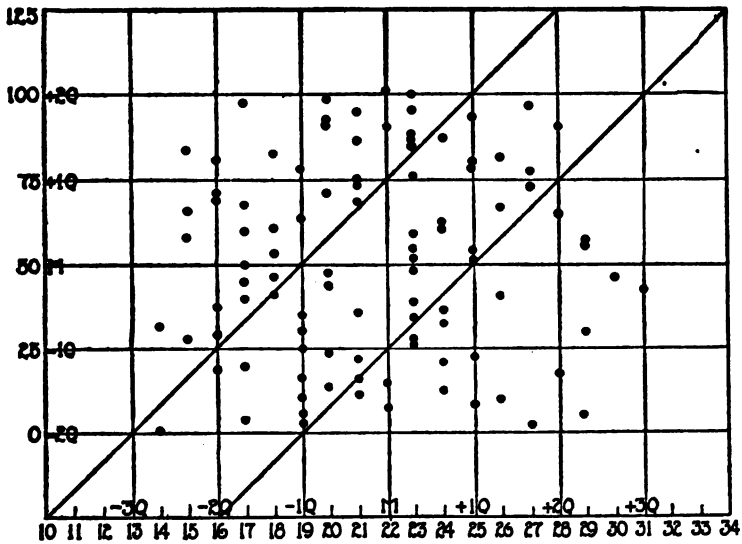


FIG. 20. Correlation graph showing relationship of scores in Alphabetical Arrangement of Names, and criterion (4 times grade location plus teachers' rating for intelligence); 100 eleven-year-olds (10 years, 7 months to 11 years, 6 months), Richmond public schools. r equals .13, P. E. .07.

case of test 2, the correlation was .67. When the scores of the two tests were combined, the correlation with the same criterion is .71 ± .02. These correlations, which were confirmed by results obtained from other groups, are to be regarded both as dependable and significant. They are not so high as the correlations of the Delta 2 with the criterion in the case of eleven-year-old children. They fall considerably short of the correlation of Delta 2 in the case of 300 children, but in both of these cases the range of ability represented in the group was greater than in the case of these eight-year-olds. This group of eight-year-olds differed only six months at the most in chronological age, whereas the eleven-year-olds showed a range of one year and the 300-group a range of several years.

In view of these facts the correlation of .67 or of .71 should be regarded as indicating considerable validity for the tests as measures for the classification of primary pupils.

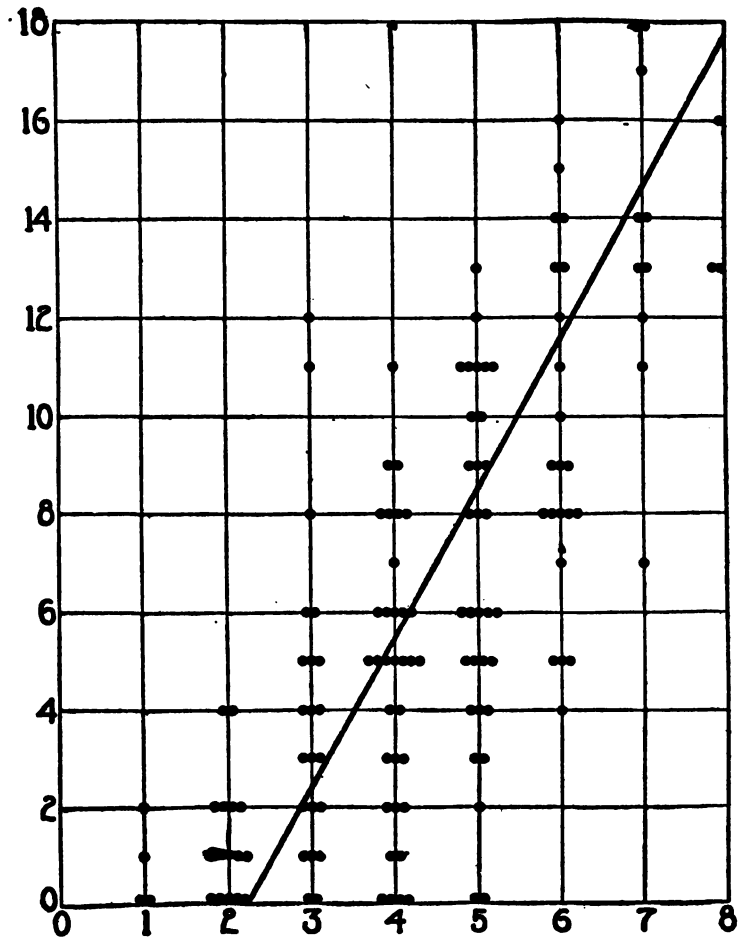


FIG. 21. Correlation graph showing relationship of scores in reading examination Sigma 1, Test 1, and criterion score (1 times grade location plus or minus T.R.I.); 144 cases eight-year-olds (7–10 to 8–3). r (Pearson) equals .668.

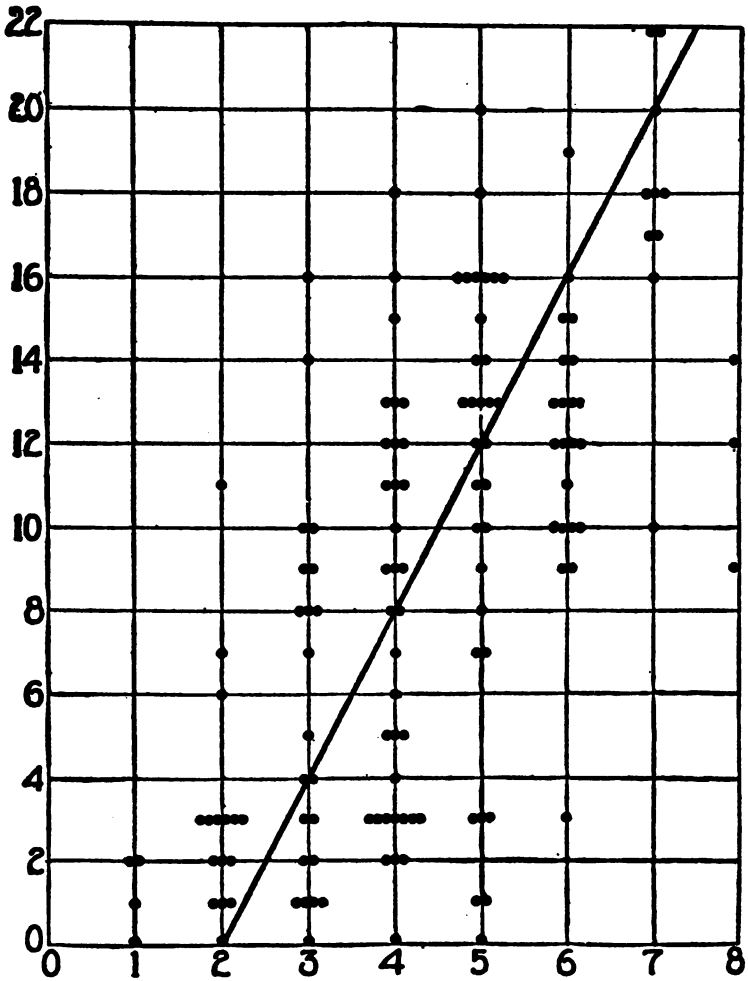


FIG. 22. Correlation graph showing relationship of scores in reading examination Sigma 1, Test 2, and criterion score (1 times G.L. plus or minus T.R.I.); 144 cases eight-year-olds (7–10 to 8–3). r (Pearson) equals .674.

TABLE 59

COEFFICIENTS OF CORRELATION

Reading Examination Sigma 1. Criterion of grade location corrected by teacher's rating for intelligence and scores in Reading Examination Sigma 1

Groups of Pupils		r (Coefficient of Correlation)	P. E. (Probable Error)
200 pupils of grades one to three	Sigma 1 — test 1	.71 ± .02	.02
	Sigma 1 — test 2	.69	.02
	Sigma 1 — tests 1 and 2	.76	02
144 eight-year-old pupils *	Sigma 1 — test 1	.67	.03
	Sigma 1 — test 2	.67	.03
	Sigma 1 — tests 1 and 2	.71	.03

* Aged 7 years and 10 months to 8 years and 3 months.

Correlation graphs for these tests are shown in Figures 21 and 23.

STANDARDS AND NORMS FOR READING EXAMINATION, SIGMA 1

As in the Delta 2 examination, it becomes convenient to arrange provisional standards for the several grades and ages. These are given in Tables 60-61. These standards, calculated from scores for two thousand pupils in Virginia and from cities outside the state, show definite step-ups for each successive age and grade. As in the case of the Delta 2, there is an apparent discrepancy between the age and grade tables, the grade norms apparently being higher than the appropriate age norm would call for. The explanation is apparently the same as there, namely, that only normal and superior pupils win promotion and the grade score is raised by this process of selection above what it would otherwise be.

INTELLIGENCE EXAMINATION, DELTA 1

Intelligence examination, Delta 1, is chiefly nonverbal in character. It contains, however, one verbal test, a form of the opposites test, so modified as to make it usable in the lower grades. Because it involves so little in the way of reading

TABLE 60

Grade standards, Achievement Test in Reading, Sigma 1

Grade		1	2	3	4
Score	Test 1	4	12	16	20
	Test 2	2	8	14	18

TABLE 61

Provisional age norms, Achievement Test in Reading, Sigma 1

Age in Years		7	8	9	10	11
Score	Test 1	6	12	15	18	24
	Test 2	4	7	12	15	19

accomplishment on the part of the children, it is usable with children who cannot be satisfactorily tested with the Sigma 1 or similar tests involving reading. The examination comprises six tests as follows: oral directions, copying designs, picture completion, picture comparison, symbol-digit, and easy opposites. Each of these tests is preceded by a fore-exercise, which is taught to the children before they are given the test proper. The whole examination is printed in a single booklet and can be given to children in groups. Each of the tests is objectively scorable by means of a key. The score is the sum total of the scores made on the six separate tests.

DISCRIMINATIVE CAPACITY OF INTELLIGENCE EXAMINATION, DELTA 1

How well the general intelligence examination, Delta 1, discriminates the individuals of a group may be seen from Table 62 and Figure 24. The percentage of zero scores is exceedingly small even for the first half of grade one. At the same time there are no perfect scores, so that the test measures both high and low levels of ability found in pri-

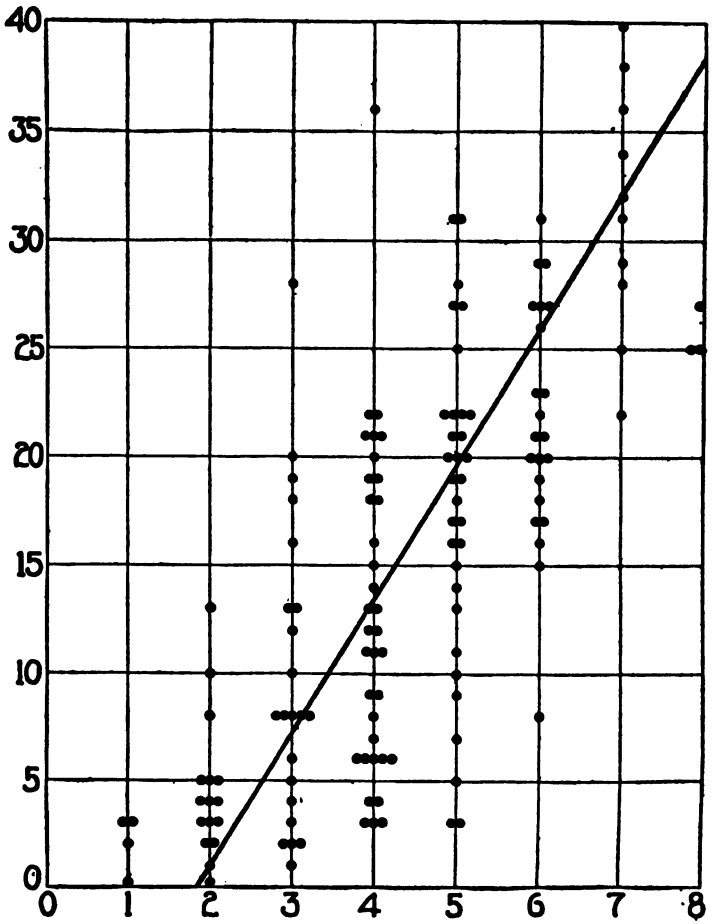


FIG. 23. Correlation graph showing relationship of scores in reading examination Sigma 1, Tests 1 and 2 (1 times G.L. plus or minus T.R.I.); 144 cases eight-year-olds (7–10 to 8–3). r (Pearson) equals .71.

TABLE 62

General Intelligence Examination Delta 1. Distribution and median scores for 817 first, second, and third grade white children in the city of Richmond.

Scores	Grade 1		Grade 2		Grade 3	
	Lower	Upper	Lower	Upper	Lower	Upper
105–109						1
100–104					1	1
95–99					4	7
90–94			1		8	10
85–89				2	7	10
80–84				1	4	4
75–79			2	7	16	14
70–74			3	7	14	14
65–69			1	12	19	13
60–64		1	9	16	31	7
55–59		4	8	24	34	4
50–54		10	21	43	9	4
45–49	1	14	27	25	11	4
40–44	1	23	30	19	6	2
35–39		31	11	13	2	1
30–34	4	23	11	8	1	1
25–29	3	31	4	5	4	
20–24	3	26	1			
15–19	8	9	6			
10–14	6	8	2			
5–9	9	3	1	1		
0–4	9	1	1	1		
Total	44	186	139	184	171	100
Median	13.3	33	45	52	63	75
Q	7.5	9.0	6.0	7.5	8.5	11.5

mary pupils. The median deviations for the several half grades are relatively small, never so great as the inter-half-grade interval. At the same time there are very definite increases from one half grade to the next, so that it is possible to fix the intergrade steps clearly.

RELIABILITY OF INTELLIGENCE EXAMINATION, DELTA 1

In reliability, the test is not quite so satisfactory as the Delta 2, although the scores made on a second giving of the

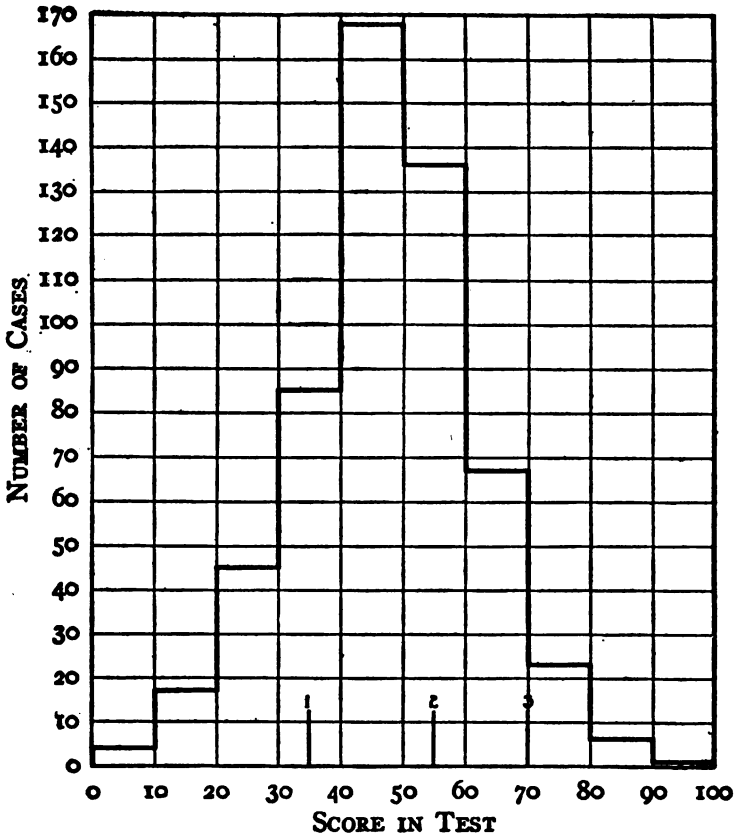


FIG. 24. Frequency distribution for Haggerty Intelligence Examination: Delta 1—552 cases in Grade 2. (Verticals numbered 1, 2, and 3 indicate medians for corresponding grades.)

test, after a two months' interval, correlated .79 with the scores of the first test, and the average increase per child in score is nine points. This relative lower reliability is common to nonverbal tests, which generally show lower coefficients of correlation for two trials of the same test than do good verbal tests. In the case of the National Intelligence Tests, eleven verbal tests used in the preliminary work showed average coefficients of reliability of .74

TABLE 63

General Intelligence Examination Delta 1. Correlation with criterion and inter-correlation of individual tests. Criterion = four times grade location of pupil plus teacher's rating for intelligence. Two hundred one cases from grades one high to three high.

	Criterion	Total	Ex. 2	Ex. 4	Ex. 6	Ex. 8	Ex. 10	Ex. 12
Criterion 4 × grade location plus teacher's rating for intelligence ..... r =	...	.67	.57	.39	.46	.40	.49	.41
P. E. = ±	...	.02	.04	.04	.04	.04	.04	.04
Delta 1, total ..... r =	.67	...	.61	.51	.64	.55	.87	.64
P. E. = ±	.02	...	.03	.04	.03	.04	.01	.03
Exercise 2, oral directions ..... r =	.57	.61	...	.33	.50	.37	.41	.24
P. E. = ±	.04	.03	...	.04	.04	.04	.04	.05
Exercise 4, copying designs ..... r =	.39	.51	.33	...	.28	.17	.31	.38
P. E. = ±	.04	.04	.04	...	.05	.05	.04	.04
Exercise 6, picture completion .... r =	.46	.64	.50	.28	...	.29	.46	.21
P. E. = ±	.04	.03	.04	.05	...	.05	.04	.05
Exercise 8, picture comparison ... r =	.40	.55	.37	.17	.29	...	.43	.15
P. E. = ±	.04	.04	.04	.05	.05	...	.04	.05
Exercise 10, symbol-digit ..... r =	.49	.87	.41	.31	.46	.43	...	.31
P. E. = ±	.04	.01	.04	.04	.04	.04	...	.04
Exercise 12, word comparison .... r =	.41	.64	.24	.38	.21	.15	.31	...
P. E. = ±	.04	.03	.05	.04	.05	.05	.04	...

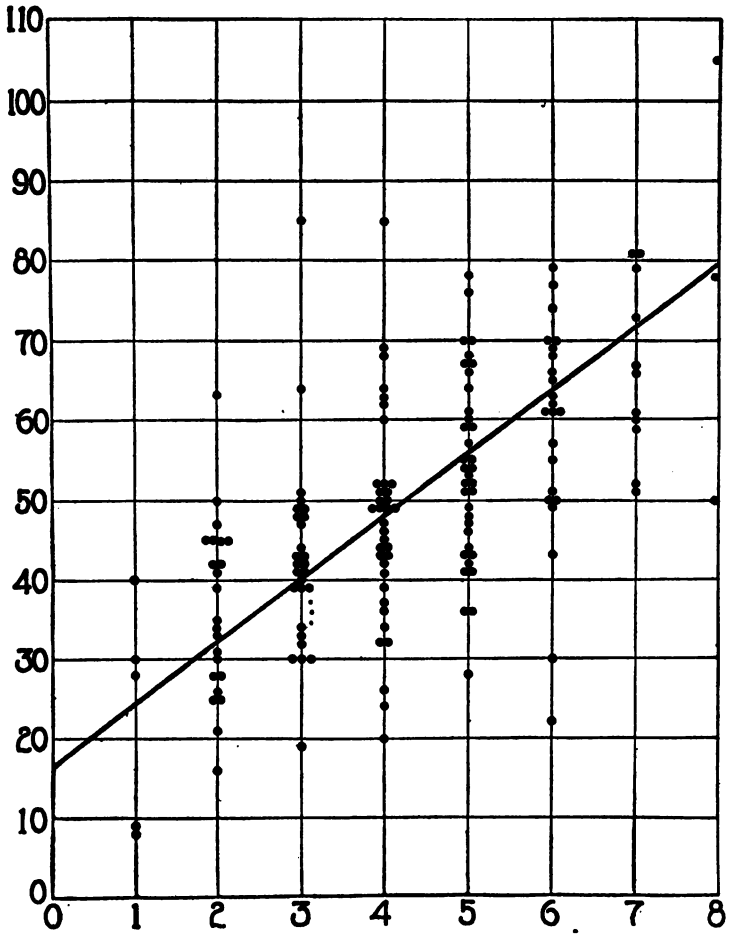


FIG. 25. Correlation graph showing relationship of scores in intelligence examination Delta 1 (1 times G.L. plus T.R.I.); 164 cases eight-year-olds (7–10 to 8–3). r (Pearson) equals .633.

(Pearson), and the nine nonverbal tests showed an average coefficient of .68.

SIGNIFICANCE OF INTELLIGENCE EXAMINATION, DELTA 1

The significance of the intelligence examination, Delta 1, is apparent from a study of the coefficients of correlation

TABLE 64

General Intelligence Examination, Delta 1. Criterion of grade location corrected by teacher's rating for intelligence, and scores in General Intelligence Examination Delta 1 *

Groups of Pupils	Correlation of Criterion	r (Coefficient of Correlation)	P. E. (Probable Error)
200 pupils of grades one to three	Delta 1, total score...	.67 ± .03	.03
	Delta 1 and Sigma 1, totals.....	.84	.01
144 eight-year-old pupils (7 years 10 months to 8 years 3 months	Delta 1, total score...	.67	.03
	Delta 1 and Sigma 1, test 1.....	.65	.03
	Delta 1 and Sigma 1, test 2	.67	.03
	Delta 1 and Sigma 1, tests 1 and 2.....	.70	.03

* See Tables 59 and 63 for coefficient of correlations of Reading Examination Sigma 1 and General Intelligence Examination Delta 1 with criterion score.

shown in Table 64. The correlation of the total score with the criterion, which is the same as that described for Sigma 1, is the most important. The coefficient in this case for the 201 cases in grades one to three is .67 ± .02. In the case of

TABLE 65

General Intelligence Examination Delta 1. Percentage distribution and median score of 201 children, grades one to three

Score	Percentage	Score	Percentage
100–104.....	1.5	50–54.....	11.0
95–99	3.0	45–49.....	7.5
90–94.....	2.0	40–44.....	5.5
85–89	3.5	35–39.....	6.0
80–84	2.0	30–34.....	3.0
75–79	5.5	25–29.....	5.5
70–74	7.0	20–24.....	3.0
65–69	9.5	15–19.....	1.0
60–64	10.0	10–14.....	1.0
55–59	11.0	5–9	1.5

Median = 57

TABLE 66

Provisional grade standards for General Intelligence Test Delta 1

Grade at end of year	1	2	3
Score	35	55	70

TABLE 67

Provisional age norms for General Intelligence Test Delta 1

Age in years	7	8	9	10
Score in points	35	50	65	75

the same 144 eight-year-olds used in the correlation for the Sigma 1, the Delta 1 gave a correlation of .64. In the case of 200 children, the Delta 1 and Sigma 1 totals combined showed a correlation with the criterion of .84. This high coefficient for the combined scores shows that the two tests give a much better rating than does either taken alone. All these results indicate that these several examinations are excellent measures for classifying children in terms of their capacity to pursue the primary school course. They, therefore, become excellent means by which to test the conditions of pupil grouping in the schools.

STANDARDS AND NORMS FOR INTELLIGENCE EXAMINATION, DELTA 1

In Table 66 will be found the grade standards for the test which are the approximate half-grade medians for a large number of pupils from the white schools of Virginia and other cities. In Table 67 norms are given for ages seven to ten. These age norms are based on the same data as are the grade norms of Table 66. It is interesting to note that these tables fail to agree, as do the similar tables for Delta 2 and Sigma 1. The increase of scores from one grade to the next is greater than the increase of age norms from one year to the next,

TABLE 68

Correlation: (Spearman) teacher's ratings for intelligence and criterion of test scores

Class	Number of Pupils	r
1	25	.447
2	14	.652
3	18	.628
4	21	.263
5	15	.132
6	11	.508
7	28	.519
8	17	.823
Median of all classes		.51
Combined	149	.40 (Pearson)

thus showing the slower school progress of the pupils of inferior capacity.

TEACHER'S RATINGS

Something should be said here concerning the value of teacher's ratings. First, the judgment of a teacher who has known a pupil in a classroom for a semester or a year is not as good a measure of the pupil's intelligence as is the intelligence examination, Delta 2, which can be given to an entire class in not to exceed thirty minutes of time.

A special study of the intelligence ratings of eight fifth-grade classes gave results shown in Table 68. The criterion was made by combining scores made by these pupils in seventeen intelligence tests[1] and the scores in the Thorndike reading scale, Alpha 2. The table shows the correlation (Spearman) of the teacher's ratings for each class and this criterion. The median of these eight correlations is .51. When the eight classes are combined, the correlation is .40 (Pearson). A computation of the correlation of teacher's ratings with the twenty intelligence tests used by the National Research Council committee showed a range from .132 to

[1] Verbal A and Verbal B, original forms of the National Intelligence Tests and general intelligence examination, Delta 2.

.823, with an average of .512, P. E. .06. These figures obtain when the ratings for a single class are taken alone, and when chronological age is apparently ignored. When the ratings for a number of classes are combined, the correlation is much less. Under essentially the same condition the Delta 2 examination correlates with the same criterion at about .76. In the case of the 100 eleven-year-olds the teacher's ratings gave a moderate correlation with the grade location, but much lower than the intelligence examination, Delta 2, which gave .771.

Second, teachers tend to ignore the chronological age of children. A child is judged by the group in which he is found whether he is older or younger than his companions. A ten-year-old child and a twelve-year-old of the same school ability are judged alike by the teacher. One hundred eleven-year-old children were found to be distributed from the low third grade to the upper sixth in the Richmond schools. The teacher's judgments of the intelligence of these children showed only fair correlation with their grade location ($r = .48$). An eleven-year-old in the low third can hardly be regarded as of average intelligence when more than fifty per cent of eleven-year-olds are in upper fourth or above. Yet the average intelligence rating given to the six pupils falling in this group was C or average. Nor is it likely that the sixteen pupils found in the upper fifth grade were merely of average intelligence, yet they were so marked. One pupil 11 years, 2 months of age, in the upper sixth grade, with a score of 100 in spelling, 13 in handwriting, 8 in addition, 7.5 in reading, and 105 in Delta 2, and who had covered four half grades in one year, was rated as of B intelligence, while another pupil rated B was 10 years 11 months of age, made 33.6 per cent in spelling, 10 in writing, 7 in addition, 5.3 in reading, 50 in Delta 2, and had done two and one half grades of school work in four and one half years, having repeated four half grades.

Third, teacher's judgments are slightly better on retarded than on accelerated children. Taking the lower half of the 100 eleven-year-olds, the correlation with grade location is .34, while on the upper half it is .12, and on the group as a

whole, .48. The implication is that teachers are better able to recognize defective children than they are to pick out superior children.

Fourth, teachers are prone to rate dull children better than they are and to judge them to have more ability than they really possess. They also tend to rate superior children below their real abilities, and probably to treat as average pupils those who deserve the opportunity for rapid progress and enriched curriculum. Among the 149 fifth-grade pupils noted above there are twenty-three who were shown by the criterion to be distinctly below average in ability. Yet fifteen of the twenty-three, or sixty-five per cent of these, were rated as average or better, and only three were ranked lower than the criterion placed them. There were fifty of the one hundred and forty-nine whom the criterion placed above the average; yet twenty-nine of these were ranked as low as average or lower, and thirty-five, or sixty-eight per cent, were ranked lower than the criterion placed them.

Fifth, teachers differ greatly in their ability to judge the intelligence of their pupils. The correlation in one case is .132, or practically zero. In another case the coefficient is .823, which indicates excellent judgment on the teacher's part.

Sixth, teachers make little distinction between the intelligence and scholarship of pupils. The correlation between the rating for the two is from .686 to .911, with an average of .80.

Two things may be said in mitigation of the severity of the foregoing criticism on teacher's judgments of the intelligence of pupils. First, the data upon which these conclusions are based were obtained from the "Teacher's Record of Pupils." It is possible that the method of securing these judgments was so new to the teachers that the record which they put down against each pupil's name would be corrected if the teachers were given more training in using rating scales. Experience in using rating scales in other connections indicates that this is so. Second, the teacher's judgment among the members of a particular class is better than the com-

bined ratings of several teachers' judgments of several classes. This means that among the forty pupils composing her own class, the teacher's judgment as to ability has considerable validity.

At the same time the teacher is apparently unable to envisage her immediate class as a part of a large group of pupils and to rank each of her forty pupils in terms of the larger group. She is unable to conceive average, inferior, and superior ability in the more objective terms of the school population as a whole. When, therefore, we have made these two admissions, we still must conclude that the teacher is in great need of some means of objectifying her judgments of the ability of her pupils. The most valuable means of correctly objectifying her judgment is the general intelligence examination, of which Delta 1, Delta 2, and the Stanford-Binet are serviceable types.

We have now examined the statistical basis for the measurements which will be used in an analysis of the conditions of grade classification in the Virginia schools, and have demonstrated the usefulness of the several intelligence tests in the grouping of children. Our next task will be in Chapter IX to study the school conditions as they exist.

CHAPTER IX

HOW VIRGINIA CHILDREN ARE GROUPED

HOW widely may the pupils of a single class vary in mental ability without interfering seriously with effective class instruction? The answer given to this question by the vast majority of good schools the country over is, "Less than six months." In this period of time normal children make a sufficient growth that promotion to a higher grade is justified. In cities, generally, there is a regrouping of pupils at the end of every semester or at the end of each four and one half months of school work. A number of schools make the readjustment three times a year or at intervals of three months. This is true in Minneapolis and St. Louis. The city schools in Virginia use the four and one half months interval.

Presumably what is implied in this practice is that a normal child in four and one half months undergoes a sufficient mental growth to require a new grade classification, new subject-matter, different methods of instruction, different work periods, and different social conditions. It should be emphasized that current practice recognizes to some extent that this mental development is not the exact counterpart of changed chronological age. It assumes a mental growth that is sometimes retarded, sometimes accelerated, and exactly correlated with chronological change in only about fifty per cent of the cases. In the case of 100 eleven-year-olds in the Richmond schools, about twenty per cent were in the normal grade, and eighty per cent were either retarded or accelerated.

INDIVIDUAL CLASSES

This generally recognized criterion of one-half year range in mental ability for grade classification is, however, not successfully carried out in practice either in the city or rural schools of Virginia, as the available facts abundantly prove. The situation, which is fairly common throughout the schools of the state, may be illustrated by the Glen Allen School in Henrico County, which is a graded rural school.

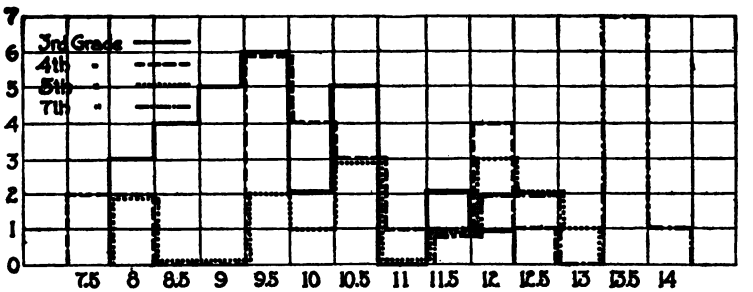


FIG. 26. Stanford-Binet intelligence test. All the children in grades 3, 4, 5, and 7 of the Glen Allen School, Henrico County. Figures on abscissa indicate mental age in half-year periods. Ordinate shows number of pupils of each mental age. Note the great overlapping of abilities.

The third grade in this school is composed of twenty-eight children, all of whom were examined with the Stanford-Binet tests in addition to the regular examinations by the survey tests. The median chronological age of the group is 10.2 years. The median mental age is nine years. From this point of view it is approximately a normal mental group. There is one child in the group, however, who has a mental age of 8.1 years, and another whose mental age is twelve years. The other children are of different mental ages between these two extremes (see Figure 23). There is a mental difference between the two extreme cases which is equivalent to the mental growth which a normal child makes in four years, or eight times the difference in mental age which good schools recognize as essential to a new classification of pupils for instructional purposes. One of these pupils is the equivalent in mental ability of an average second-grade child; the other is equal to the average sixth-grader.

The condition of this Glen Allen class is not only representative of a general condition throughout the state of Virginia, but there is abundant evidence to show that it is not peculiar to the schools of that state. Whatever criticism of Virginia schools is involved in the succeeding discussion would be generally applicable to schools elsewhere.

Before proceeding further to examine the situation as revealed by the intelligence tests, it may be well to note the

TABLE 69

	Pupil X	Pupil A
Spelling	3 Third Grade Standard	9 Eighth Grade Standard
Handwriting Quality	9 Third Grade Standard	13 Eighth Grade Standard
Reading	4.1 Third Grade Standard	6.6 Sixth Grade Standard
Addition	11 Third Grade Standard	18 Seventh Grade Standard
Delta 2	43 Third Grade Standard	105 Sixth Grade Standard
Age	12 years 7 months	11 years 9 months

light which the results of the achievements tests throw on the situation. In the Highland Springs School is a fifth-grade class of forty-five pupils. The range of achievement in this class is shown in the records of two pupils who stand at the extreme upper and lower limits of the class (see Table 69).

It is obvious that pupil X is uniformly of third-grade ability and achievement, even though 12 years and 7 months of age. She had started to school at about seven and a half years of age and had attended school the full five years. She was present on the two different days, about six weeks apart, when tests were given, was rated as of average intelligence by her teacher, and the records do not show that she had ever missed a promotion. Pupil A on the other hand started to school at seven and a half years, had done five years' work in the four years she had attended school, was easily of sixth-grade ability, was rated by her teacher as of superior ability, and in achievement she equaled in various studies the standard scores of the sixth, seventh, or eighth grade.

Accepting the scores in addition, Thorndike reading, and the intelligence examination, Delta 2, as a basis of grouping,

the abilities of the forty-five children of this fifth grade appear as follows:

TABLE 70

Ability of Grade	Number of Pupils
Three or below	6
Four	12
Five	18
Six	7
Seven	2

Lest the reader may think that this situation is peculiar to the rural schools, we may examine a class in one of the best city schools in the state, the Ginter Park School in the city of Richmond. For the thirty-five pupils in the 4A class of this school we have the Stanford-Binet tests in addition to numerous other examinations. The Stanford-Binet ratings by half years which fairly represent the combined results of all tests given to this class are as follows:

TABLE 71

Range in Mental Age	Number of Pupils
7 years 10 months to 8 years 3 months	2
8 " 4 " " 8 " 9 "	2
8 " 10 " " 9 " 3 "	4
9 " 4 " " 9 " 9 "	4
9 " 10 " " 10 " 3 "	5
10 " 4 " " 10 " 9 "	10
10 " 10 " " 11 " 3 "	3
11 " 4 " " 11 " 9 "	4
11 " 10 " " 12 " 0 "	1

In mental age there is a range of eight half years between the poorest child in the group and the best one, or the amount of mental growth which a normal school child makes in four years. The average chronological age of the six most mature pupils in the class was 9 years, 8 months. For the six lowest pupils it was 9 years, 9 months. In mental age, however, the highest group averaged 11 years, 6 months,

while the poorest averaged but 8 years, 7 months, a mental difference between the two groups of about three years. The two best pupils averaged 5.8 in reading and the two poorest 4.1, a difference of six half grades in achievement.

EXAMINATION OF LARGER GROUPS

If the meaning of these concrete cases is clear, we may turn to an examination of the general situation by an analysis of larger groups in city and rural schools. The discussion in Chapter VIII developed the fact that the best instruments used in Virginia for measuring the condition of classification are the general intelligence examinations, Delta 1 and Delta 2, in grades one to eight, and the achievements examination in reading, Sigma 1, in grades one to three.

INTELLIGENCE EXAMINATION, DELTA 2

If we turn to the results of the Delta 2 examination, the situation shown by the achievements and the Stanford-Binet tests is further demonstrated. The 5A class of twenty pupils in the Midway School in Charlottesville has four pupils who score 38 or less, which is about third-grade ability, and it has one child who scores 94, or approximately sixth-grade quality. Of fifteen pupils in the 5B class in one Portsmouth school five pupils score 95 or better, about sixth-grade standard, and three pupils score below 70. Of fifteen 5B pupils in the Commerce Street School of Roanoake, four score equal to sixth grade or better and there are three as low or lower than the fourth-grade median.

In Tables 72–77 will be found the scores for the several groups of Virginia pupils tested. In general these tables show the distribution of pupils by grades and half grades for the several types of rural and city schools, both white and colored. In addition to the distribution, each table gives the median scores and the average deviation for each group.

Two significant facts stand out in these tables. The first is the variation in median scores shown by the various groups. To facilitate the interpretation of these median scores they are gathered together in Table 78.

TABLE 72*a*

General Intelligence Examination Delta 2; 6184 rural white pupils. Distribution, median scores, and average deviations by grades arranged by one, two, three, four and more teacher schools for the following counties: Greensville, Henrico, Isle of Wight, Lancaster, Loudoun, Northampton, Rockbridge, Rockingham, Smyth, Stafford, and Wise

Scores	Grade 3					Grade 4				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
110–114	.....	.....	.....	.....	.....	.....	.....	.....	1	1
105–109	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
100–104	.....	.....	.....	1	1	.....	.....	.....	1	1
95–99	.....	.....	.....	.....	.....	.....	2	.....	3	5
90–94	.....	.....	.....	1	1	.....	1	.....	6	7
85–89	.....	.....	.....	.....	.....	.....	.....	.....	17	17
80–84	.....	.....	.....	1	1	.....	.....	.....	21	21
75–79	.....	.....	.....	2	2	.....	2	1	27	30
70–74	.....	.....	.....	6	6	.....	2	2	40	44
65–69	.....	1	.....	9	10	4	1	4	65	74
60–64	1	.....	.....	17	18	2	5	4	95	106
55–59	.....	1	.....	40	41	6	6	6	114	132
50–54	2	4	3	48	57	4	13	2	135	154
45–49	1	3	4	79	87	10	16	14	124	164
40–44	3	12	1	101	117	8	20	7	116	151
35–39	10	24	3	150	187	5	12	19	112	148
30–34	8	22	5	149	184	7	15	7	99	128
25–29	8	24	6	156	194	6	15	5	59	85
20–24	7	29	13	131	180	7	10	4	37	58
15–19	10	21	13	75	119	8	5	.....	21	34
10–14	7	15	7	37	66	5	3	1	15	24
5–9	8	13	6	22	49	1	.....	.....	7	8
0–4	3	1	.....	3	7	.....	1	.....	.....	1
Total	68	170	61	1028	1327	73	129	76	1115	1393
Median	24.3	26.3	21.9	33	31.3	38	41	41.4	48.7	48.5
A. D.										

Reference to the standard grade scores given in Table 57 will facilitate this interpretation. Judged by this measure,

TABLE 72b

General Intelligence Examination Delta 2; rural white pupils. Distribution median scores, and average deviation by grades for the following counties: Albemarle, Amelia, Appomattox, Caroline, Carroll, Charlotte, Giles, Greensville, Henrico, Isle of Wight, Lancaster, Loudoun, Northampton, Rockbridge, Rockingham, Smyth, Stafford, and Wise. Arranged by one-teacher, two-teacher, three-teacher, and four or more teacher schools

Scores	Grade 5					Grade 6				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
140–144	.....	.....	.....	.....	.....	.....	.....	.....	1	1
135–139	.....	.....	.....	.....	.....	.....	.....	.....	2	2
130–134	.....	.....	.....	.....	.....	.....	.....	.....	8	8
125–129	.....	.....	.....	2	2	.....	.....	.....	6	6
120–124	.....	.....	.....	2	2	.....	.....	.....	14	14
115–119	.....	.....	1	3	4	.....	2	.....	18	20
110–114	.....	1	.....	20	21	.....	1	1	30	32
105–109	1	.....	.....	11	12	.....	.....	3	40	43
100–104	.....	.....	.....	18	18	.....	2	2	70	74
95–99	.....	2	.....	38	40	1	5	3	93	102
90–94	2	.....	2	37	41	1	5	3	34	43
85–89	.....	2	2	88	92	1	8	6	103	118
80–84	1	3	3	98	105	2	7	7	104	120
75–79	2	7	5	113	127	5	10	6	99	120
70–74	9	16	3	99	127	4	9	12	88	113
65–69	12	12	3	138	165	3	6	7	54	70
60–64	7	11	4	120	142	2	8	5	78	93
55–59	6	11	14	108	139	4	11	4	53	72
50–54	4	12	10	46	72	5	5	5	48	63
45–49	9	9	5	77	100	1	3	2	28	34
40–44	5	12	5	56	78	.....	2	1	14	17
35–39	2	4	3	36	45	.....	2	1	10	13
30–34	3	1	3	15	22	.....	2	1	1	4
25–29	.....	1	1	9	11	.....	.....	1	7	8
20–24	1	.....	2	5	8	.....	.....	.....	4	4
15–19	1	.....	.....	6	7	.....	.....	.....	1	1
10–14	1	1	1	.....	3	.....	.....	.....	.....	.....
5–9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0–4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	66	105	67	1145	1383	29	88	70	1008	1195
Median	60.7	60.9	56.4	68.4	67.0	70	72.8	73.3	80.8	79.4
A. D.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 72c

General Intelligence Examination Delta 2; 6184 rural white pupils. Distribution, median scores, and average deviation by grades for the following counties: Albemarle, Amelia, Appomattox, Caroline, Carroll, Charlotte, Giles, Greensville, Henrico, Isle of Wight, Lancaster, Loudoun, Northampton, Rockbridge, Rockingham, Smyth, Stafford, and Wise, arranged by one-teacher, two-teacher, three-teacher, and four or more teacher schools

Scores	Grade 7				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
140–144	1			1	2
135–139		1		8	9
130–134	1			9	10
125–129			1	20	21
120–124		1		26	27
115–119	1		2	47	50
110–114	1	4	3	44	52
105–109	1	4	2	71	78
100–104		3	2	68	73
95–99	2	2	1	84	89
90–94		6	7	93	106
85–89	2	2	9	69	82
80–84	2	4	4	62	72
75–79	1	3	4	50	58
70–74		4	4	44	52
65–69	2	2	4	40	48
60–64		3	2	14	19
55–59		1	3	8	12
50–54		1		12	13
45–49				5	5
40–44			2	1	3
35–39				2	2
30–34					
25–29				1	1
20–24					
15–19					
10–14					
5–9					
0–4				2	2
Total	14	41	50	781	886
Median	90.0	90.8	86.1	94.4	93.4
A. D.					

TABLE 73

General Intelligence Examination Delta 2; 3541 city white pupils. Showing distribution, median scores, and average deviations by half grades for the following cities: Charlottesville, Danville, Harrisonburg, Lynchburg, Newport News, Norfolk, Portsmouth, Richmond, and Roanoke

Scores	Grades									
	III		IV		V		VI		VII	
	Lower Half	Upper Half	Lower Half	Upper Half	Lower Half	Upper Half	Lower Half	Upper Half	Lower Half	Upper Half
150–159	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
140–149	.....	.....	.....	.....	.....	1	.....	1	4	11
130–139	.....	.....	.....	.....	.....	1	3	8	12	31
120–129	.....	.....	.....	1	.....	4	12	18	26	54
110–119	.....	.....	.....	.....	2	8	35	37	54	86
100–109	.....	.....	3	3	12	28	45	62	78	87
90–99	.....	1	6	15	43	49	78	104	74	65
80–89	1	8	23	24	55	80	64	53	53	30
70–79	7	13	47	38	77	66	66	36	24	8
60–69	16	45	63	72	63	43	37	17	17	2
50–59	41	55	77	62	43	26	14	8	8	1
40–49	83	84	72	58	18	6	1	1	.....	1
30–39	106	98	58	22	5	2	3	2	1	1
20–29	116	54	16	11	6	1	.....	1	.....	.....
10–19	39	16	1	2	1	.....	.....	.....	.....	.....
0–9	8	.....	.....	1	.....	.....	.....	.....	.....	.....
Total	417	374	366	309	325	315	358	349	351	377
Median	34.3	42.3	54.7	59.8	73.5	81.8	89.1	95.4	99.7	109.2
A. D.	11.1	12.9	15.2	15.4	15.2	14.0	17.3	16.7	14.8	14.6

it would appear that only the white city pupils of Virginia meet these standard conditions. Every other group falls lower than the white city pupils and lower than the 2323 pupils outside the state. The several types of schools assume in general the following order of decreasing efficiency: city white, four-teacher non-city white, city colored, one-teacher

TABLE 74

General Intelligence Examination Delta 2; 3541 city white pupils. Distribution, median scores, and average deviation by grades for the following cities: Charlottesville, Danville, Harrisonburg, Lynchburg, Newport News, Norfolk, Portsmouth, Richmond, and Roanoke

Scores	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
150–159	.....	.....	.....	1	.....
140–149	.....	.....	1	1	15
130–139	.....	.....	1	11	43
120–129	.....	1	4	30	80
110–119	.....	.....	10	72	140
100–109	.....	6	40	107	165
90–99	1	21	92	182	139
80–89	9	47	135	117	83
70–79	20	85	143	102	32
60–69	61	135	106	54	19
50–59	96	139	69	22	9
40–49	167	130	24	2	1
30–39	204	80	7	5	2
20–29	170	27	7	1	.....
10–19	55	3	1	.....	.....
0–9	8	1	.....	.....	.....
Total	791	675	640	707	728
Median	38.0	57.0	77.4	92.7	104.8
A. D.	12.6	14.4	14.2	14.7	14.2

rural white, three-teacher non-city colored, and one-teacher rural colored. Broadly speaking, it may be said that the pupils in these several school groups are prepared through whatever causes of heredity, general environment, and previous school conditions in about the order given to do the work of the elementary school course.

OVERLAPPING

The second significant fact revealed by Tables 72–78 is the great amount of overlapping of one grade upon another. In every grade are pupils who would be better classified if placed one or two grades above the one they are in and other pupils whose mental level is one or more steps below. The

TABLE 75

General Intelligence Examination Delta 2; 976 city colored pupils. Distribution, median scores, and average deviation by grades for the following cities: Danville, Lynchburg, Norfolk, Richmond, and Roanoke

Scores	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
130-134	.....	.....	.....	.....	.....
125-129	.....	.....	.....	1	2
120-124	.....	.....	.....	.....	2
115-119	.....	.....	.....	.....	4
110-114	.....	.....	.....	1	7
105-109	.....	.....	.....	2	6
100-104	.....	.....	1	6	13
95-99	.....	2	2	11	13
90-94	.....	.....	6	5	15
85-89	.....	1	13	15	20
80-84	.....	2	3	23	22
75-79	.....	3	20	20	13
70-74	.....	6	20	23	12
65-69	.....	4	22	18	13
60-64	1	12	15	19	7
55-59	.....	13	24	15	8
50-54	7	15	17	8	2
45-49	7	31	12	1	1
40-44	9	31	6	4	1
35-39	25	23	12	3	1
30-34	32	21	5	2	.....
25-29	47	15	2	2	.....
20-24	46	12	1	.....	.....
15-19	39	3	.....	.....	.....
10-14	28	.....	.....	.....	.....
5-9	11	.....	.....	.....	.....
0-4	5	1	.....	.....	.....
Total	257	196	181	179	163
Median	25.0	43.7	64.0	73.9	85.5
A. D.	8.8	11.5	13.5	13.4	11.1

percentages for this overlapping are shown in Tables 79–81 and are illustrated graphically in Figures 27–28.

The average overlapping of one grade upon the median of the next in rural schools is apparently 18.5 per cent. Figure 24 shows the distribution of scores in this examination for 6184 pupils in the rural schools by whole grades. The medians

TABLE 76a

General Intelligence Examination Delta 2; colored pupils. Distribution, median scores, and average deviation by grades for the following counties: Appomattox, Caroline, Carroll, Charlotte, Isle of Wight, Lancaster, Northampton, and Stafford, arranged by one-teacher, two-teacher, three-teacher, and four or more teacher schools

Scores	Grade 3					Grade 4				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
90–94	.....	.....	.....	.....	.....	.....	1	.....	.....	1
85–89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
80–84	.....	.....	.....	.....	.....	.....	.....	1	1	2
75–79	.....	.....	.....	.....	.....	.....	.....	.....	1	1
70–74	.....	.....	.....	.....	.....	1	1	2	.....	4
65–69	1	.....	.....	.....	1	1	1	1	.....	3
60–64	.....	.....	2	1	3	1	3	3	55	12
55–59	.....	.....	3	1	4	3	4	10	4	21
50–54	.....	2	6	1	9	6	4	.....	4	16
45–49	2	3	1	6	12	7	3	7	4	21
40–44	4	3	6	3	16	9	14	10	1	34
35–39	8	6	7	.....	21	8	16	16	6	46
30–34	15	4	9	7	35	15	12	17	5	49
25–29	15	11	16	12	54	12	11	11	7	41
20–24	13	12	12	3	40	10	8	4	3	25
15–19	20	14	11	4	49	9	4	5	.....	18
10–14	18	16	14	6	54	4	6	1	1	12
5–9	24	10	9	4	47	11	5	2	.....	18
0–4	24	9	1	1	36	2	5	.....	.....	7
Total	144	90	97	49	381	101	98	90	42	331
Median	16.5	18.6	25.6	27.9	20.5	31.3	34.2	36.6	39.2	34.2
A. D.	10.1	10.0	11.6	11.1	11.4	12.7	12.3	10.4	13.4	12.6

for the several grades are indicated by the heavy vertical lines. There are 10.4 per cent of the third-grade pupils who equal or exceed 48, the median score for the fourth grade (see Table 57), and 10.5 per cent of the fourth grade who equal or

TABLE 76*b*

General Intelligence Examination Delta 2; colored pupils. Distribution median scores, and average deviation by grades for the following counties: Appomattox, Caroline, Carroll, Charlotte, Isle of Wight, Lancaster, Northampton, and Stafford, arranged by one-teacher, two-teacher, three-teacher, and four or more teacher schools

Scores	Grade 5					Grade 6				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
125–129	.....	.....	.....	.....	.....	1	.....	.....	.....	1
120–124	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
115–119	.....	.....	1	.....	1	.....	.....	.....	.....	.....
110–114	.....	.....	.....	1	1	.....	.....	.....	.....	.....
105–109	.....	.....	.....	.....	.....	.....	1	.....	.....	1
100–104	.....	.....	.....	.....	.....	.....	1	.....	.....	1
95–99	.....	.....	1	.....	1	.....	.....	1	.....	1
90–94	.....	.....	.....	.....	.....	1	1	4	1	7
85–89	2	.....	2	1	5	2	1	1	5	9
80–84	.....	2	.....	.....	2	1	1	1	2	5
75–79	3	.....	3	2	8	1	5	3	1	10
70–74	5	2	7	4	18	2	3	6	3	14
65–69	2	1	3	4	10	2	1	3	6	12
60–64	7	4	6	4	21	3	4	6	4	17
55–59	2	4	6	6	18	1	1	6	4	12
50–54	6	7	6	7	26	3	3	7	2	15
45–49	8	10	5	5	28	3	3	1	2	9
40–44	3	4	5	5	17	2	1	1	2	6
35–39	8	4	8	1	21	2	2	1	1	6
30–34	10	4	4	1	19	.....	1	.....	.....	1
25–29	10	2	1	1	14	2	.....	.....	2	4
20–24	4	4	1	.....	9	.....	.....	.....	.....	.....
15–19	3	3	1	.....	7	2	.....	.....	.....	2
10–14	2	1	.....	.....	3	.....	.....	.....	.....	.....
5–9	2	1	1	.....	4	.....	.....	.....	.....	.....
0–4	.....	2	.....	.....	2	.....	.....	.....	.....	.....
Total	77	55	61	42	235	28	29	41	35	133
Median	40.0	46.5	54.2	55.8	48.9	55.0	65.0	64.2	65.8	64.1
A. D.	16.0	14.5	15.4	11.5	15.4	18.9	15.6	11.7	13.4	14 3

TABLE 76c

General Intelligence Examination, colored pupils. Distribution, median scores, and average deviation by grades for the following counties: Appomattox, Caroline, Carroll, Charlotte, Isle of Wight, Lancaster, Northampton, and Stafford, arranged by one-teacher, two-teacher, three-teacher, and four or more teacher schools.

Scores	Grade 7				
	One-teacher Schools	Two-teacher Schools	Three-teacher Schools	Four-teacher Schools	Total
125–129	.....	2	.....	.....	2
120–124	.....	3	1	.....	4
115–119	.....	.....	.....	.....	.....
110–114	.....	.....	.....	1	1
105–109	1	.....	1	.....	2
100–104	1	3	1	2	7
95–99	.....	3	1	2	6
90–94	.....	2	1	4	7
85–89	3	3	4	5	15
80–84	.....	2	1	4	7
75–79	.....	6	4	3	13
70–74	1	6	5	4	16
65–69	1	3	5	2	11
60–64	2	5	5	1	13
55–59	1	2	3	5	11
50–54	1	1	1	.....	3
45–49	.....	1	.....	.....	1
Total	11	42	33	33	119
Median	75.0	77.5	73.0	82.5	76.9
A. D.	15.6	15.9	20.3	11.9	14.0

exceed 67, the median score for the fifth grade. If we may assume that the proper division between the fifth grade and the sixth is just halfway between the two median scores, then there are 27.2 per cent of the fourth grade who would be better grouped if they were in grade five. Conversely, there are 32.5 per cent of the fifth grade who would be better classified in the fourth grade. The foregoing statements are made without reference to the reliability of the Delta 2 test, which is not perfect. Taking this into account and re-

TABLE 77

General Intelligence Examination Delta 2; 975 colored city pupils. Distribution, median scores, and average deviations by half grades for the following cities: Danville, Lynchburg, Norfolk, Richmond, and Roanoke

Scores	Grade 3		Grade 4		Grade 5		Grade 6		Grade 7	
	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half	1st Half	2d Half
135–139	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
130–134	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
125–129	.....	.....	.....	.....	.....	.....	.....	1	.....	2
120–124	.....	.....	.....	.....	.....	.....	.....	.....	1	1
115–119	.....	.....	.....	.....	.....	.....	.....	.....	3	1
110–114	.....	.....	.....	.....	.....	.....	.....	1	3	4
105–109	.....	.....	.....	.....	.....	.....	1	1	4	2
100–104	.....	.....	.....	.....	.....	1	.....	6	4	9
95–99	.....	.....	.....	2	1	1	2	9	5	8
90–94	.....	.....	.....	.....	4	2	1	4	9	6
85–89	.....	.....	1	.....	3	10	5	10	8	12
80–84	.....	.....	1	1	3	.....	6	17	12	10
75–79	.....	.....	.....	3	3	17	3	17	10	3
70–74	.....	.....	2	4	5	15	8	15	5	7
65–69	.....	.....	3	1	10	12	11	7	7	6
60–64	.....	1	2	10	7	8	2	17	6	1
55–59	.....	.....	3	10	11	13	4	11	6	2
50–54	3	4	6	9	11	6	3	5	2	.....
45–49	2	5	13	18	8	4	.....	1	.....	1
40–44	.....	9	14	17	2	4	3	1	1	.....
35–39	4	21	12	11	6	6	3	.....	.....	1
30–34	12	20	17	4	4	1	1	1	.....	.....
25–29	18	29	9	6	2	.....	2	.....	.....	.....
20–24	18	28	7	5	1	.....	.....	.....	.....	.....
15–19	13	26	1	2	.....	.....	.....	.....	.....	.....
10–14	12	16	.....	.....	.....	.....	.....	.....	.....	.....
5–9	5	6	.....	.....	.....	.....	.....	.....	.....	.....
0–4	4	1	1	.....	.....	.....	.....	.....	.....	.....
Total	91	166	92	103	81	100	55	124	86	77
Median	23.3	26.0	39.6	46.9	58.2	68.3	70.0	77.3	82.5	88.3
A. D.	8.3	8.9	10.8	11.9	13.7	12.2	13.8	12.5	14.1	13.8

TABLE 78

General Intelligence Examination Delta 2. Median scores for several Virginia groups by grades and composite median for 2323 children outside of Virginia

Group	Grades					
	III	IV	V	VI	VII	VIII
250 white pupils in one-teacher rural schools of Virginia	24	38	61	70	90	.....
5077 white pupils in four-teacher non-city schools of Virginia	31	49	68	80	93	.....
3541 white city pupils of Virginia	38	57	78	93	105	117*
2323 city school pupils outside of Virginia	39	59	72	94	107	119
976 colored city pupils of Virginia	25	44	64	74	86	97*
361 colored pupils in one-teacher rural schools of Virginia	17	31	40	55	75	.....
201 colored pupils in three-teacher non-city schools of Virginia	28	39	55	66	83	.....

* First-year high school.

computing the amount of overlapping and wrong classification, it is found that, on the average, one grade in the rural schools overlaps the median ability of the next about 16 per cent, and the average per cent of improvable classification is about 65 per cent.

CITY SCHOOLS

Figure 29 shows the distribution and grade medians for the city schools by half grades. Three thousand five hundred and forty-one pupils are represented in these curves. The average overlapping of one half grade over the median of the next half grade is 31.4 per cent (see Table 80). The per cent of apparently wrong classification is 81.4. When these figures are corrected for the unreliability of the tests, the overlapping

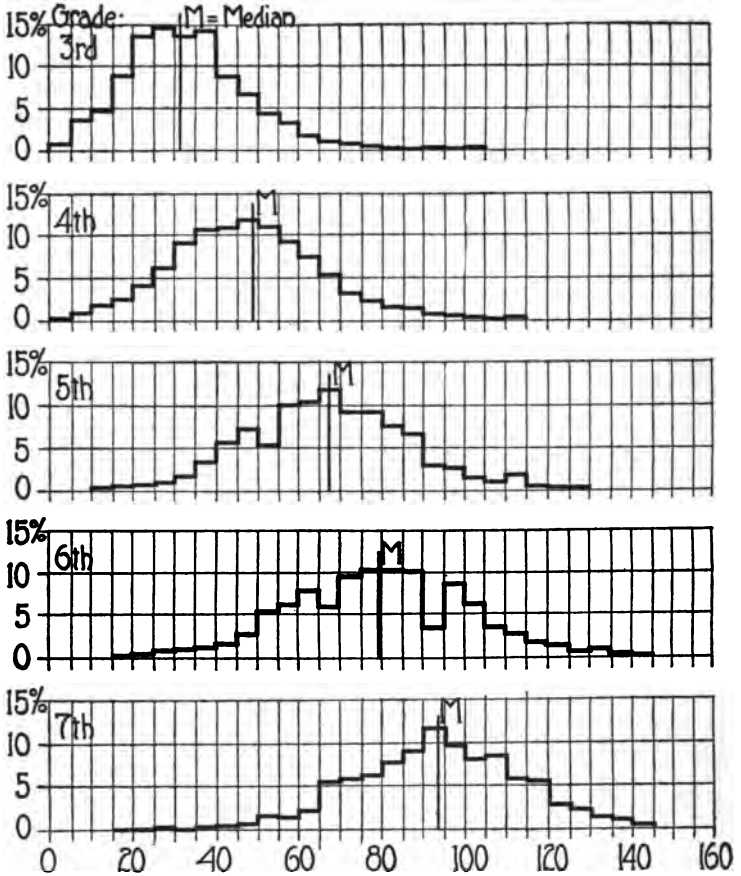


Fig. 27. General intelligence examination, Delta 2; overlapping of grades, 6184 pupils in 18 counties. Figures on ordinate indicate percentage making each score. Figures on abscissa show points in Delta 2 test. Vertical lines M indicate median of each grade.

is still 30 per cent, and the amount of improvable classification is 80 per cent.

These figures give a better relative showing to the rural school than is their due, since the basis of classification in these schools is one school year, whereas in the city schools it is one semester or four and one half school months.

TABLE 79. *General Intelligence Examination Delta 2, overlapping of grades; rural white pupils. Percentage of pupils in each grade above the median of the grade next above, and percentage of pupils in each grade below the median of the grade next below*

Overlapping in Percentage	Grades				Average
	III–IV	IV–V	V–VI	VI–VII	
Upward	10.4	10.5	25.1	28.1	18.5
Downward	16.1	18.6	30.4	23.3	22.1

TABLE 80. *General Intelligence Examination Delta 2, overlapping of half grades; city white pupils. Percentage of pupils in half grades above the median of the half grade next above, and percentage of pupils in each half grade below the median of the half grade next below*

Overlapping in Percentage	Half Grades									Average
	Three Lower Three Upper	Three Upper Four Lower	Four Lower Four Upper	Four Upper Five Lower	Five Lower Five Upper	Five Upper Six Lower	Six Lower Six Upper	Six Upper Seven Lower	Seven Lower Seven Upper	
Upward	30.9	26.0	38.8	21.7	30.0	31.6	36.7	37.7	28.6	31.4
Downward	30.3	24.7	39.4	21.6	32.3	37.1	32.8	40.0	27.6	31.6

TABLE 81. *General Intelligence Examination Delta 2, overlapping of grades; city white pupils. Percentage of pupils in each grade above the median of the grade next above, and percentage of pupils in each grade below the median of the grade next below*

Overlapping in Percentage	Grades				Average
	III–IV	IV–V	V–VI	VI–VII	
Upward	15.6	14.6	19.7	23.9	18.4
Downward	7.1	9.6	22.3	25.7	16.1

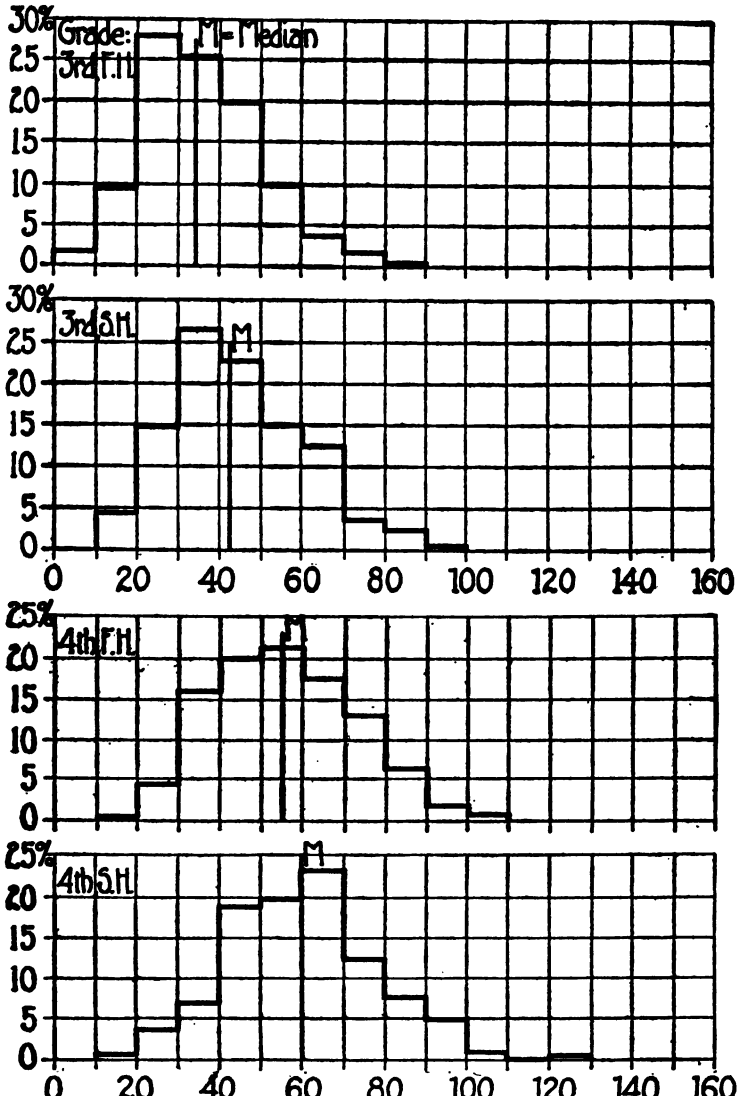


FIG. 28. General intelligence examination, Delta 2; overlapping of half-grades, 3541 pupils in grades 3 to 7 in 8 Virginia cities. Figures on ordinate indicate percentage making each score. Figures on abscissa show points in Delta 2 test. Vertical lines M indicate median of each half grade.

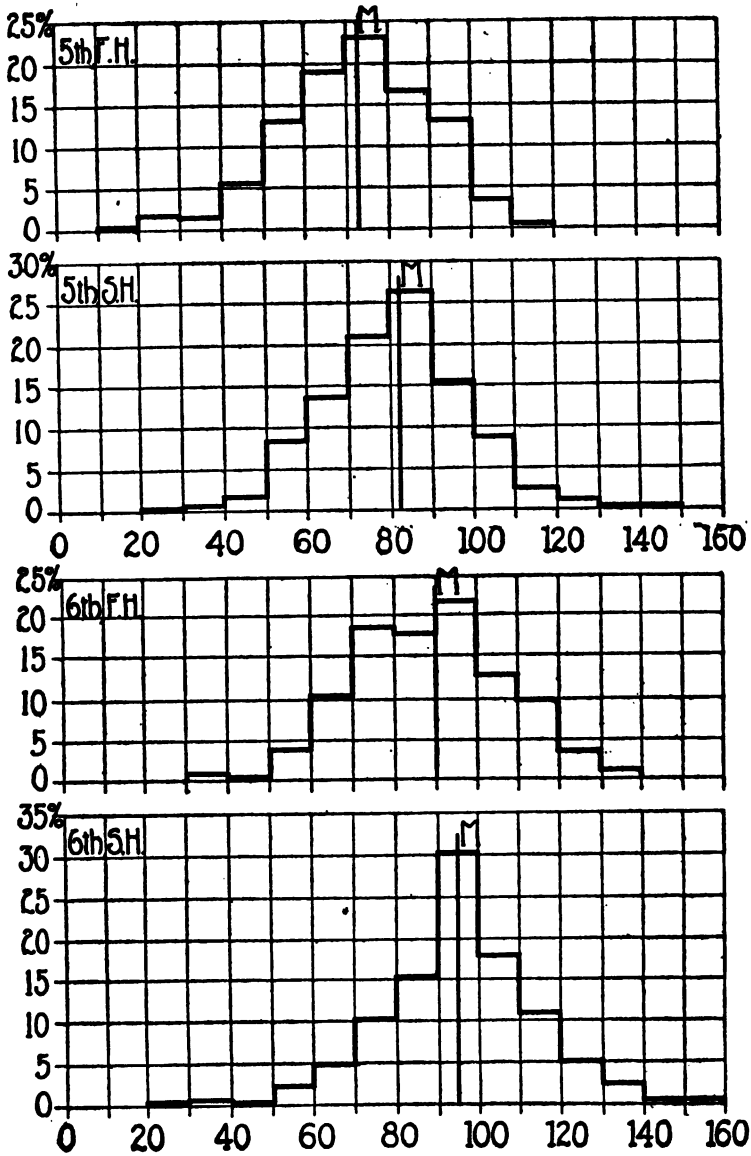


FIG. 28.—*Continued*

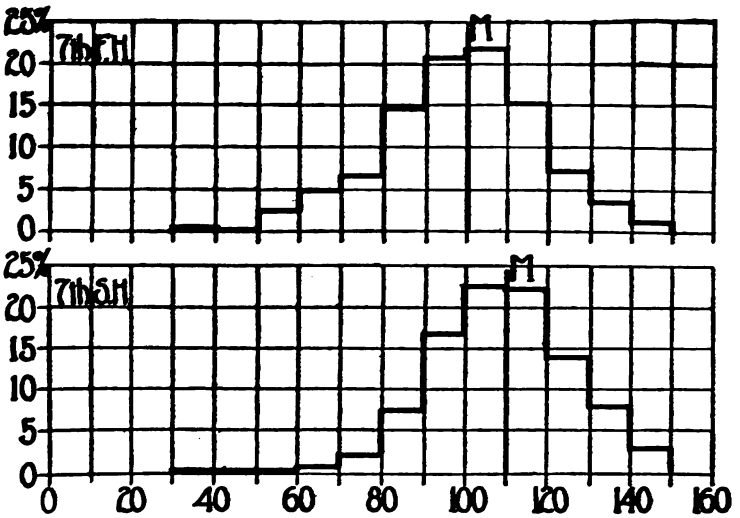


FIG. 28.—*Continued*

If we reduce the city figures to the same basis as those of the rural school, namely one school year to the grade, then the average amount of overlapping of one grade above the median of the one next above is 18.4 per cent (see Table 81), and of each grade below the median of the one next below, is 16.1 per cent. From these figures the amount of improvable classification is computed as 60 per cent as contrasted with 65 in the rural schools.

Some of the apparent harshness of these figures may be softened by a comparison with the 2323 children tested in Aberdeen, Baltimore, Cleveland, Evansville, Indianapolis, Louisville, Rochester, and Santa Anna. The overlapping in the case of these cities is 30.4 per cent for each grade exceeding the median of the half grade next above it, and the amount of improvable classification is 76.6 per cent as compared with the 81.4 per cent in Virginia cities.

The foregoing figures are somewhat misleading as regards any particular school. They are only true if one considers a grade as something stable and exact which should be rigidly

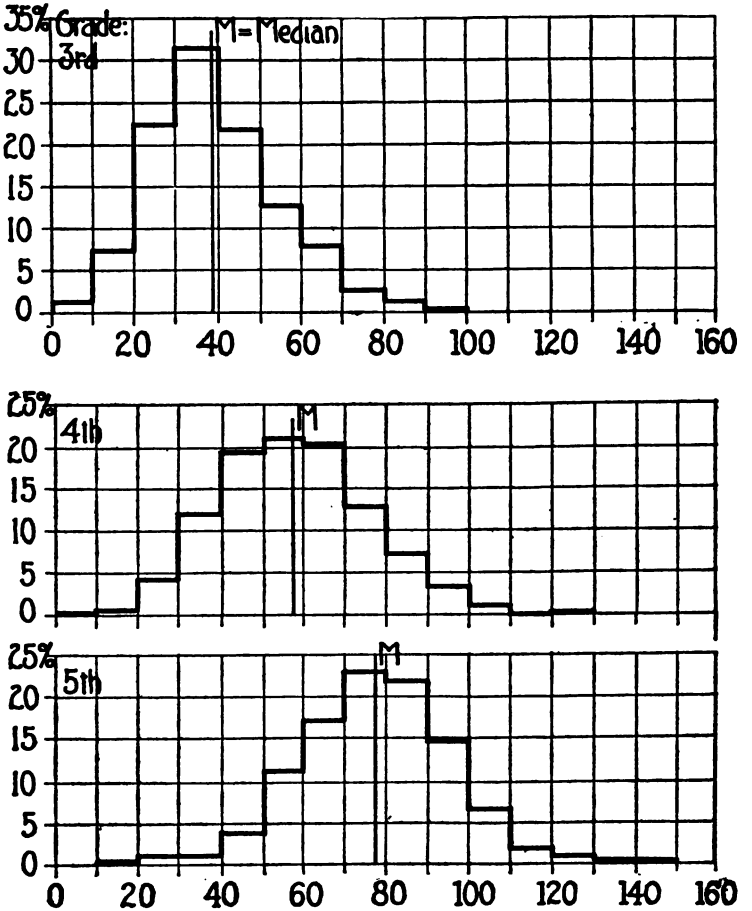


FIG. 29. General intelligence examination, Delta 2; overlapping of grades, 3541 pupils in grades 3 to 7 in 9 Virginia cities. Figures on ordinate indicate percentage making each score. Figures on abscissa show points in Delta 2 test. Vertical lines M indicate median of each grade.

adhered to in every school and in every class. There are certain purposes for which such a conception of grades is necessary. This is true in the case where a child transfers

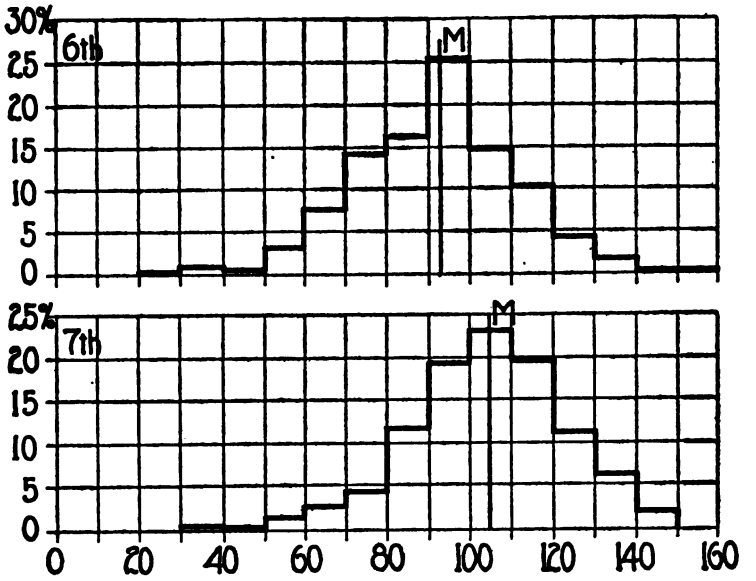


FIG. 29.—*Continued.*

from one school to another, or when an advanced grammar school or high school receives its students from several lower schools, or when a board of education issues a certificate or diploma to pupils completing the seventh or eighth grades, or when grade standards are to be set for a school district comprising several different schools. For all these and like needs the figures given above for improvable classification hold. There are less than forty per cent of both the rural and city children of Virginia properly classified for these purposes even on the assumption of a full year to each grade.

It is, however, possible that a single school might have a lower or higher standard for each grade than a school in another city. In such case the overlapping of grade upon grade when the schools of the two cities were combined would be very much greater than the overlapping of the several grades of either of the cities, taken singly. A large amount

of the apparent overlapping shown for the rural and city schools as wholes is certainly due to this cause.

But even in a school unit as homogeneous as the city of Richmond the same wide range of grading occurs. The per cent of overlapping as measured by Delta 2 is 26.4 for the half grades three low to seven high, and the amount of improvable classification is about seventy-five per cent.

READING EXAMINATION, SIGMA 1

Turning to the reading test, Sigma 1, for the cities of Richmond and Norfolk, we find the average overlapping of one half grade upon the median of the grade next above to be 23.8 per cent for test 1 and 20.4 per cent for test 2. (See Tables 82 and 83.) The distributions for the Sigma 1 examination are given in Tables 20–21, pages 47–48. The overlapping downward is 25.2 per cent for test 1 and 26.9 per cent for test 2. On the basis of these figures the amount of improvable classification in the first three grades of these cities is 63 per cent for test 1 and 64.3 per cent as measured by test 2. Considering Norfolk alone, it is 54 per cent as

TABLE 82

Reading Examination Sigma 1, test 1, overlapping of half grades. Percentage of pupils in each half grade above the median of the half grade next above, and percentage of pupils in each half grade below the median of the grade next below for Norfolk and Richmond

Overlapping in Percentage	Half Grades				Average
	One Upper Two Lower	Two Lower Two Upper	Two Upper Three Lower	Three Lower Three Upper	
Upward.....	16.31	15.76	34.49	28.78	23.8
Downward.....	24.86	17.99	33.44	24.63	25.2

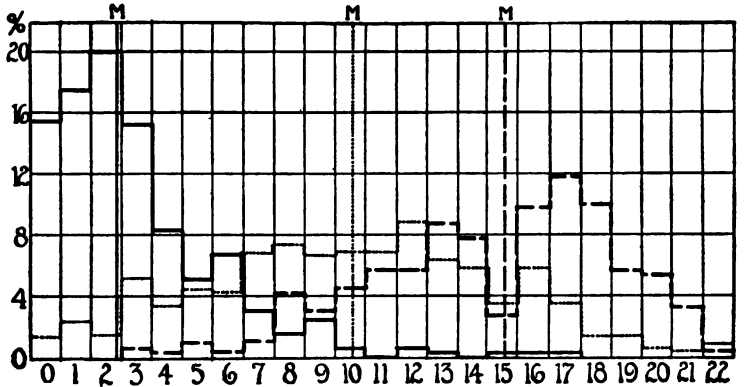


FIG. 30. Distribution scores for 1911 white pupils, reading examination Sigma 1, Test 1, in Norfolk and Richmond. Full drawn line indicates grade one, second half; dotted line, grade 2, second half; dash line, grade 3, second half.

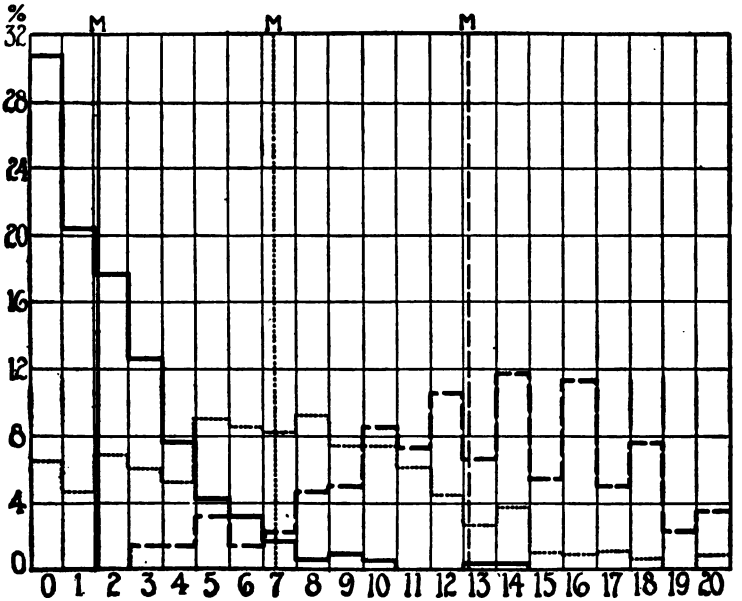


FIG. 31. Distribution of scores for 1911 white pupils in Norfolk and Richmond in Reading Examination Sigma 1, Test 2. Heavy drawn line indicates grade 1, second half; dotted line indicates grade 2, second half; dash line indicates grade 3, second half.

TABLE 83

Reading Examination Sigma 1, test 2, overlapping of grades. Percentage of pupils in each half grade above the median of the half grade next above, and percentage of pupils in each half grade below the median of the grade next below for Norfolk and Richmond

Overlapping in Percentage	Half Grades				Average
	One Upper, Two Lower	Two Lower Two Upper	Two Upper Three Lower	Three Lower Three Upper	
Upward	17.98	11.57	24.27	27.61	20.4
Downward	33.87	23.37	26.15	24.19	26.9

measured by test 1 and 56 per cent for test 2. For Richmond the figures are 55 per cent for test 1 and 57 per cent for test 2.

With these figures in mind we may now recall that, judged by the common practice of good city schools, the proper range in mental age for the most efficient instruction is from one quarter to one half year. If this may be regarded as reasonably correct, then the amount of incorrect classification found in both the city and rural schools of Virginia must certainly be a great handicap to efficient instruction, and some means should be sought for its improvement.

INTELLIGENCE EXAMINATION, DELTA 1

The story of overlapping told by intelligence examination, Delta 2, and reading examination, Sigma 2, is confirmed by the result of intelligence examination, Delta 1. The distribution figures with median scores and average deviations are given in Tables 84–87 for about two thousand rural and city pupils. There is the usual step-up in median score from each grade or half grade to the one next above, the variation in median scores from one group to another, and the extensive overlapping of grade upon grade. If teaching technique were really adjusted to the varying abilities of the pupils, as we

TABLE 84

General Intelligence Examination Delta 1. Distribution and median scores for 609 white children in non-city schools

Scores	Grade 1	Grade 2	Grade 3
100–104	.....	.....	1
95–99	.....	.....	1
90–94	.....	.....	2
85–89	.....	.....	4
80–84	.....	1	7
75–79	1	3	9
70–74	.....	4	19
65–69	2	4	12
60–64	2	12	17
55–59	4	16	27
50–54	11	29	29
45–49	11	23	16
40–44	14	29	16
35–39	23	29	15
30–34	29	24	9
25–29	23	17	4
20–24	19	14	1
15–19	20	11	1
10–14	22	4	1
5–9	12	2	.....
0–4	.....	4	.....
Total	193	226	191
Median	30.2	41.3	55.7
A. D.	11.7	12.7	12.7

imagine it to be, the teaching of classes so illy grouped would be an impossibility. Even with the unrefined methods of instruction prevailing in most schools these heterogeneous groupings of pupils are a great handicap to good teaching and to a good school product.

IMPROVEMENT OF SCHOOL GRADING

The improvement of school grading involves two factors: first, better methods of determining the particular pupils who should be classed together, and, second, better facilities for grouping and instruction. Attention should be given to both

TABLE 85

General Intelligence Examination Delta 1. Distribution and median scores for 500 white children in the city of Norfolk

Scores	1 H	2 L	2 H	3 L	3 H
100–104	.....	.....	.....	.....	1
95–99	.....	.....	.....	.....	2
90–94	.....	.....	.....	1	2
86–89	.....	.....	.....	1	5
80–84	.....	.....	3	2	12
75–79	1	.....	1	6	10
70–74	.....	2	3	7	21
65–69	.....	2	8	10	19
60–64	.....	5	17	13	17
55–59	3	3	13	14	12
50–54	4	4	19	13	12
45–49	10	15	26	5	5
40–44	19	7	22	8	4
35–39	21	7	18	5	3
30–34	23	16	10	.....	1
25–29	32	9	7	.....	.....
20–24	21	5	3	.....	.....
15–19	14	2	1	.....	.....
10–14	6	1	.....	.....	.....
5–9	3	.....	.....	.....	.....
0–4	1	.....	.....	.....	.....
Total	158	78	151	85	126
Median	30.4	38.4	47.9	59.1	67.3
A. D	14.2	11.1	10.2	9.9	10.7

of these matters, both in the urban and in the rural schools of Virginia.

Let us first give consideration to the matter of selecting the pupils who should constitute a particular grade. The first need here is a frank recognition on the part of school authorities of the part which original native capacity plays in the ability of pupils to do school work. We no longer need to argue that children develop at different rates, and that one child at the age of eight may have the same capacity as another child at the age of ten, which a third may not possess until he is twelve. This much may be taken as established. It is further demonstrated in every dependable

TABLE 86

General Intelligence Examination Delta 1. Distribution and median scores for 817 first, second, and third grade white children in the city of Richmond

Scores	1 L	1 H	2 L	2 H	3 L	3 H
105–109	.....	.....	.....	.....	.....	1
100–104	.....	.....	.....	.....	1	4
95–99	.....	.....	.....	.....	4	7
90–94	.....	.....	1	.....	8	10
85–89	.....	.....	.....	2	7	10
80–84	.....	.....	.....	1	4	4
75–79	.....	.....	2	7	16	14
70–74	.....	.....	3	7	14	14
65–69	.....	.....	1	12	19	13
60–64	.....	1	9	16	31	7
55–59	.....	4	8	24	34	4
50–54	.....	10	21	43	9	4
45–49	1	14	27	25	11	4
40–44	1	23	30	19	6	2
35–39	.....	31	11	13	2	1
30–34	4	23	11	8	1	1
25–29	3	31	4	5	4	.....
20–24	3	26	1	.....	.....	.....
15–19	8	9	6	.....	.....	.....
10–14	6	8	2	.....	.....	.....
5–9	9	3	1	1	.....	.....
0–4	9	1	1	1	.....	.....
Total	44	184	139	184	171	100
Median	13.3	33.0	45.0	52.3	63.0	75.0
A. D	9.0	9.5	10.0	14.7	11.2	13.0

study made that the usual methods of determining the instructional needs of pupils fail to place many children where they can profit most by the work of the school, that many children could make more rapid progress through the grades if their real capacities were given free opportunity, and that others are dragged along in work they cannot do.

Apparently the thing most needed to supplement the generally available means of grade classification is a general intelligence examination. Thanks to recent developments, stimulated largely by the psychological work of the army, we are no longer confined to the individual intelligence ex-

TABLE 87

General Intelligence Examination Delta 1. Distribution and median scores for first, second, and third grade white children. Norfolk 500, Richmond 817

Scores	1 L	1 H	2 L	2 H	3 L	3 H
105–109	.....	.....	.....	.....	.....	1
100–104	.....	.....	.....	.....	1	4
95–99	.....	.....	.....	.....	4	8
90–94	.....	.....	1	.....	9	12
85–89	.....	.....	.....	2	8	12
80–84	.....	.....	.....	4	6	9
75–79	.....	1	2	8	22	26
70–74	.....	.....	3	10	21	24
65–69	.....	.....	3	20	29	**34**
60–64	.....	1	11	33	**44**	26
55–59	.....	7	13	37	48	21
50–54	.....	14	24	**62**	22	16
45–49	1	24	31	51	16	16
40–44	1	42	**45**	41	14	7
35–39	.....	52	18	31	7	5
30–34	4	**46**	18	18	1	4
25–29	3	63	20	12	4	1
20–24	3	47	10	3	.....	.....
15–19	8	23	11	1	.....	.....
10–14	6	14	4	1	.....	.....
5–9	9	6	2	1	.....	.....
0–4	9	2	1	.....	.....	.....
Total	44	342	217	335	256	226
Median	13.3	31.7	42.5	50.6	61.5	68.5
A. D.	9.0	9.4	11.1	10.2	10.8	12.7

amination. We can test pupils in groups, and the methods of examination are sufficiently standardized that teachers who are well-trained normal-school graduates can be quickly taught to make the examination, compute scores, and interpret the results. This makes possible the intelligence examination of all the pupils of the school, and enables every teacher to supplement all her other information about pupils by what she learns from objective intelligence tests. The first step in the improvement of school grading is, therefore, to improve the means by which the capacities of pupils are determined,

and this implies the general use of the group intelligence examination.

A word of caution should be urged against abandoning other well-tried means of rating pupils and a too exclusive re-

TABLE 88

PUPIL'S PERSONNEL CARD

Name.....Race.....

Date of Birth.....Grade.....Date.....

Age at entering School.....Date.....

STANDARDIZED TESTS

	Score			
	Points	M. A.	I. Q.	
Intelligence				
1				Date
2				Date
3				Date
Reading				
1				Date
2				Date
3				Date
Arithmetic				
1				Date
2				Date
3				Date
Spelling				
1				Date
2				Date
3				Date
Handwriting				
1				Date
2				Date
3				Date
Grammar				
etc.				

(*Continued on page 189*)

SCHOOL MARKS

	Year in School							
	1	2	3	4	5	6	7	8
Reading								
Arithmetic								
Spelling								
Handwriting								
Language								
Grammar								
Geography								
History								

TEACHER'S RATING

	Year in School							
	1	2	3	4	5	6	7	8
Intelligence								
Scholarship								
Industry								

liance on the intelligence tests. A teacher must still preserve his common sense, his balance of judgment, and make use of all the available data which throw light on the power of the pupil to do work. The information which it seems important to consider as a basis of school classification is represented in Table 88, which may be printed on a card and serve as a permanent traveling record of a pupil.

Where the meaning of the available data is not clear, i.e., where some information points to one mode of action and other data point in the opposite direction, recourse should be had to an individual mental examination with the Stanford-Binet or some equally serviceable individual examination.

REMEDIAL MEASURES

The practical question of what to do with a pupil who is found to be misplaced is not always simple or easily answered.

The most direct action is to transfer such a pupil from the class in which he is found to one where the abilities of the group are more nearly equal to his own. This can usually be done if the indicated change is promotion to the half grade or grade ahead. Children who deserve such promotion will usually catch step with the new group in a few weeks. When a child is found in a grade beyond his abilities, the change is usually less easily made, because demotion involves a certain stigma and consequent discouragement to a pupil and to his friends. If, however, the demotion is clearly indicated by the best data obtainable, it should be made in a manner least likely to embarrass or discourage the child.

SPECIAL CLASSES FOR BACKWARD PUPILS

Merely shifting pupils from one to another grade, however, does not meet all the needs of unusual pupils. In city schools throughout the country the practice has become quite general of organizing special classes for backward and subnormal pupils. In the city of Richmond, for example, this practice has made considerable headway, and during the year 1918–19 such classes were conducted as a part of the city school system. The Richmond program for the conduct of these classes is apparently sound. The children who are to be in-

TABLE 89

Showing the grade distribution of 286 eleven-year-old pupils in the schools of eleven counties, and of 287 eleven-year-old pupils in eight cities. Actual ages ten years nine months to eleven years three months

Grade	Rural Schools	City Schools	
		First Half Year	Second Half Year
3	66	28	38
4	106	50	42
5	98	50	47
6	15	17	20
7	1	.....	.....
Total	286	287	

cluded in these classes are selected by a trained psychological examiner who examines the children with mental tests, the Stanford-Binet being in use at the time of the survey. The children so selected are gathered into special classes taught by specially trained teachers. They are given an increased amount of hand work, larger freedom, and more play. Their school progress is slower, but as rapid as their abilities permit.

While the Richmond classes for backward pupils are subject to a great deal of improvement, they are still worthy of serving as a pattern for the organization of similar classes in the other cities of the state. There should be a considerable development of such classes in every school where conditions allow. Where properly organized and conducted, they not only serve to relieve the regular classes of pupils who do not or cannot profit by the ordinary work of the school, but serve as genuine opportunity classes for the pupils who enter them.

CLASSES FOR GIFTED CHILDREN

While it is important to do all that can possibly be done for backward children, it is clear that superior children are a much more significant asset. The group of superior children now in our schools contains most of the real leaders of the next generation, and it is important that they be given the best possible education. There is a growing movement to organize special classes for these children either for the purpose of more rapid progress or of an enriched curriculum.

The survey did not bring to light any provision for special classes of gifted pupils in Virginia schools, although the city of Richmond was on the eve of organizing one such class. The pupils for such a class at the Ginter Park School were selected during the survey, and the class was to start in September, 1919. This experiment should be followed carefully by other cities of the state, so that whatever is worthy may be adopted in other places.

The public schools of America have had little experience in educating superior children as a group, and there is doubtless much yet to be learned concerning the matter. It is a good augury that we have learned how to discover such pupils

in the schools through mental tests, and this method of selecting gifted children for special classes should be strictly adhered to. Special classes for either backward or gifted pupils organized on any other basis are likely to fail.

BUREAUS OF EDUCATIONAL RESEARCH

From a consideration of the intelligence examination of pupils and the organization of special classes for their instruction we are led to the problem of organizing the testing program of a city school system, and the development of methods by which the facts needed by teachers, supervisors, and superintendents may be obtained. The program for such work should be somewhat as follows:

1. There should be an administrative and supervisory division of the school system specifically charged with this work, with a definite title, as Bureaus of Educational Research or its equivalent.

2. The work of the division should be broadly conceived so as to include the collection of all sorts of data in addition to test results that may be needed by the school authorities.

3. In the actual work of testing, the teaching staff should be brought into coöperation and trained to do such of the work as they can learn to do. This teaching staff coöperation has two purposes: (1) to train the teachers to appreciate the results of tests, and (2) to secure the necessary clerical help without which most school systems could not secure the amount of examination necessary.

4. The results of the examination should be reported faithfully to the teachers, and the supervisory force should see to it that they carefully improve their work on the basis of the results.

5. The Bureau of Educational Research should have as director a well-trained person with the powers of an assistant superintendent. It should also have on its staff persons trained in the use of statistical methods in the study of school problems and in the psychological examination of children. It is probably more efficient to gather all such specialists into a single bureau under a single administrative head than to

have each scientific specialist working alone, since such organization makes for better coördination of work.

While the larger city school systems may profitably organize such bureaus of educational research, there will be a large number of smaller cities and rural districts which will not be able to take such a step. To meet the needs of such school divisions, the State Board of Education should organize a bureau within its supervisory staff and provide it with sufficient money to carry forward the work which the survey has initiated. It is safe to say that unless the administrative agencies in Virginia, both state and local, try very definitely to follow up the results of the survey, the work done in tests and measurements will amount to very little. On the other hand, if the state and local boards will plan for the continuation of the measurement work through the establishment of such bureaus of research as are here recommended, then the work begun by the survey may grow and become a highly efficient means of improving the school work of Virginia.

TABLE 90

General Intelligence Examination Delta 2. Median scores for various age groups of Virginia city children

Approximate Age Group	Including Pupils of Ages	Number of Pupils	Median Scores
8.0 years	7 years 10 months to 8 years 3 months	27	.....
8.5 "	8 " 4 " " 8 " 9 "	105	37.5
9.0 "	8 " 10 " " 9 " 3 "	166	37.5
9.5 "	9 " 4 " " 9 " 9 "	202	42.5
10.0 "	9 " 10 " " 10 " 3 "	342	46.1
10.5 "	10 " 4 " " 10 " 9 "	249	72.5
11.0 "	10 " 10 " " 11 " 3 "	228	65.2
11.5 "	11 " 4 " " 11 " 9 "	202	65.1
12.0 "	11 " 10 " " 12 " 3 "	246	69.4
12.5 "	12 " 4 " " 12 " 9 "	193	75.8
13.0 "	12 " 10 " " 13 " 3 "	213	80.4
13.5 "	13 " 4 " " 13 " 9 "	170	84.5
14.0 "	13 " 10 " " 14 " 3 "	131	92.5
14.5 "	14 " 4 " " 14 " 9 "	77	85.2
15.0 "	14 " 10 " " 15 " 3 "	41	95.2
15.5 "	15 " 4 " " 15 " 9 "	24	99.0
16.0 "	15 " 10 " " 16 " 3 "	11	100.0
16.5 "	16 " 4 " " 16 " 9 "	2	.....

CHAPTER X

THE ONE-TEACHER SCHOOL

ALMOST one half of the white children (44 per cent) of Virginia receive their education in one-teacher and two-teacher schools. Such schools are the only educational provision for two thirds of the colored children of the state. The product of schools of this type is, therefore, of tremendous significance in the educational life of Virginia, and because this product is of such a deficient character, the small rural school constitutes one of the most serious educational problems not only in Virginia, but throughout the South.

From the standpoint of their inception such schools represent the earliest and well-nigh universal yearnings of the American people for educational opportunities, and in a way typify the fundamental belief of American democracy in the values of information and training. In contrast, however, to the best educational provisions made for urban children in Virginia and elsewhere, these rural schools are little short of tragic.[1]

The population of these schools is commonly of the most heterogeneous sort. Anywhere from five to sixty, or even more, children may be found in one schoolroom to be taught by one teacher. The pupils represent the whole range of mental development and educational advancement to be found in well-graded schools. Classes are often composed of one, two, or three pupils. About sixty per cent of all the pupils in these schools are in the first two grades. The teacher, usually young, badly trained, and inexperienced, confronts a program of thirty or more classes a day and is expected to teach all subjects to all kinds of pupils.

It is not surprising to one who visits these schools and sees the painful contrast between them and the best city schools in Richmond, Norfolk, or Lynchburg, to learn that the educational achievement of the pupils found in these buildings is ex-

[1] For a general description of one-teacher and two-teacher schools in Virginia, see *Virginia Public Schools*, Part 1, especially Chapter XV.

ceedingly low. In the first place, the school life of these children is in general characterized by late entrance, irregular attendance, and a short school term, so that it is not surprising to find that they are, grade for grade, from one to three years overage as compared with the children in well-graded city schools. Notwithstanding the greater age of these pupils, they are found by every test given to be from one half to three years behind children of corresponding grades in the city schools. The figures for the one-teacher and four-teacher non-city schools and for corresponding grades in city schools are shown in tables already given. In the fundamentals of arithmetic, the one-teacher school is always inferior. The highest median score in addition in the one-teacher school, made by seventh-grade children, was exceeded by the sixth-grade children in the four-teacher school and by the fifth-grade children in the city schools. Compared with the Woody standard, the score is no higher than should have been achieved three and one half years earlier.

In reading, the field in which most Virginia cities achieve their best record, the pupils of the one-teacher school are one year behind those of the four-teacher school, and about two and one half years behind the median scores of the Virginia cities. In spelling the results show the one-room schools to be three and one half years short of achieving the standard set in the Ayres spelling scale, and one and one half years behind the records of city schools of Virginia.

In handwriting the story is the same. In many of these schools the desks were so badly cut and marked that it was impossible to use them in testing the handwriting of the children. In some schools there were no desks at all. So common was this condition that in testing the handwriting in these schools, the survey examiners carried with them a complete set of large cardboards which were distributed to the pupils to be used on top of the scarred desks or, in the absence of desks, to be held on the pupil's knees. The handwriting scores show exactly what one would expect. The pupils of the rural schools average about two years below the Starch standards and about three years below the Freeman standards for the same grades.

These measured facts, coupled with the great overageness of the rural pupils — always greatest in the one-room schools — and with the low per cent of attendance and great elimination in grades six and seven, show how far short the great state of Virginia comes from realizing the ideals of a truly democratic system of education. With three fifths of her total population living in "the open country or in communities of less than one hundred persons," the state confronts in these rural schools a problem difficult but compelling. Complicated as it is by racial problems and by poor roads which render the transportation of pupils difficult and at times impossible, its adequate solution calls for heroic measures. The way out can be found if the conscience of the state can be aroused to a realization that the problem is not in any real sense a local problem, that the proper training of all its citizens is the state's business, laying claim for generous support upon the entire wealth of the state.

Few states are so rich in political and educational traditions as is Virginia. In few communities have the voices which spoke for liberty and equality and opportunity been heard so distinctly as here. Today the ancient faith of this people confronts an unaccomplished task. From every corner of this great Commonwealth rise the voices of little children appealing for the privilege to learn. They ask for better buildings, for good seats and desks, for a longer school term, for better trained teachers, for libraries in their schools, for comfortable and sanitary toilets, for blackboards and maps, for music and good play. Can any citizen of Virginia doubt that these children, grown to manhood, will amply repay in industrious and intelligent citizenship the maximum which the state can now devote to their training and culture?

RECOMMENDATIONS

The one outstanding recommendation for the improvement of the Virginia one-teacher school is to abandon it wherever possible in favor of consolidation. Because of certain geographical conditions, particularly in the mountain sections in the western part of the state and in certain sparsely populated regions, it is not possible to abandon all

of the one-teacher schools. A certain percentage of the children of Virginia must still receive their whole education in schools of this type, but a thoroughgoing program of consolidation could eliminate in a few years practically two thirds of the one-teacher schools now existing in the state.

Where consolidation is undertaken, it should be radical and thoroughgoing. Little, if anything, is gained by giving up a one-teacher school for a two- or even three-teacher school. The results of the tests and measurements indicate that advantages accruing from consolidation become marked only in the case of the four or more teacher schools. It is the school of this type, therefore, with commodious and well-constructed buildings, that should be striven for. Properly made buildings in pleasant and attractive surroundings and with good equipment will bring together suffciently large numbers of children that grading may be effectively carried out, and conditions of this sort with adequate salaries will invite well-trained teachers to conduct these schools.

Where consolidation is not possible, heroic effort should be made to improve the buildings, grounds, equipment, and instruction in the one-teacher schools. Many of the local communities will feel unable to meet the expense incident to such a program; some communities probably will be economically unable to meet the situation properly. The state, however, should see to it that aid is furnished to such communities out of the treasury of the state. The children of the remotest rural districts, whose parents contribute in their measure to the wealth and prosperity of the state, have a just claim upon the increasing bounty of the commonwealth, and a proud state will not deal niggardly with its children. Virginia has no more pressing educational problem than these rural schools which furnish the sole educational opportunity for more than one half of its children. There should be a generous state aid to these schools and a vigorous policy in the office of the state superintendent looking toward the improvement of these schools. Broadly conceived, this policy should embrace new and adequate buildings in good surroundings, a school term of not less than 180 days, adequate equipment, library, and apparatus, qualified teachers well paid, and compulsory school attendance on the part of the pupils.

CHAPTER XI

HIGH-SCHOOL COMPOSITION

THE following report is based upon the results of a test in English composition given between May 8 and June 10, 1919, to 887 first-year pupils[1] from twenty-five high schools (of which two were for colored children) in twelve counties of Virginia.

An effort was made, with the help of the Virginia State Department of Education, to choose educationally typical counties and typical schools within those counties. Table 91 gives a complete list of the schools tested, with the maximum number of pupils whose composition scores figure in these results, and the scores by schools, by sexes, and when possible, by semesters.

[1] Nearly a thousand compositions were written, but some schools failed to provide sufficient supplementary information to warrant including them in the results. Still other schools, which figure in a part of the data, have had to be omitted from other tables.

KEY TO TABLE 91

	HIGH SCHOOL	COUNTY	POST OFFICE
1.	Armstrong	Henrico	Richmond
2.	Bainbridge	Chesterfield	Richmond
3.	Binford	Henrico	Richmond
4.	Booker T. Washington	Norfolk	Norfolk
5.	Boydton	Mecklenburg	Boydton
6.	Boykins	Southampton	Boykins
7.	Buckhorn	Mecklenburg	Union Level
8.	Capron	Southampton	Capron
9.	Courtland	Southampton	Courtland
10.	Drewryville	Southampton	Drewryville
11.	Floyd	Floyd	Floyd
12.	Fredericksburg	Spottsylvania	Fredericksburg
13.	Hamilton	Cumberland	Cartersville
14.	Hutcheson	Mecklenburg	Baskerville
15.	Ivor	Southampton	Ivor
16.	Jefferson	Nansemond	Suffolk
17.	John Marshall	Henrico	Richmond
18.	Lacrosse	Mecklenburg	Lacrosse
19.	Matthew Maury	Norfolk	Norfolk
20.	Midway	Dinwiddie	Sutherland
21.	Narrows	Giles	Narrows
22.	Pearisburg	Giles	Pearisburg
23.	Reams	Dinwiddie	Reams
24.	Varina	Henrico	Richmond (R.F.D. 5)
25.	Walter Reed	Warwick	Newport News

TABLE 91

English Composition. Scores for first-year classes in twenty-five Virginia high schools. Arranged by races and sexes

School (For key to numbers see opposite page)	Race	Number of Boys	Number of Girls	Number of Boys and Girls	Median Scores								
					Boys			Girls			Boys and Girls		
					Low	High	Low and High	Low	High	Low and High	Low	High	Low and High
1	C	24	52	76	5.05	5.09	5.06	5.06	5.30	5.15	5.05	5.25	5.11
2	W	31	47	78	4.10	4.30	4.17	5.40	4.80	5.22	4.60	4.60	4.60
3	W	42	66	108	5.30	5.59	5.55	5.45	5.45	5.45	5.45	5.57	5.49
4	C	19	59	78	3.96	4.53	4.33	4.53	4.80	4.55	4.13	4.68	4.48
5	W	1	8	9	.....	.....	5.00*	.....	.....	5.45	.....	.....	5.30
6	W	1	11	12	.....	.....	4.60	.....	.....	4.60	.....	.....	4.60
7	W	3	5	8	.....	.....	5.30	.....	.....	4.97	.....	.....	5.15
8	W	3	5	8	.....	.....	4.70	.....	.....	5.30	.....	.....	4.97
9	W	10	7	17	.....	.....	4.40	.....	.....	4.89	.....	.....	4.63
10	W	4	4	8	.....	.....	5.30	.....	.....	4.80	.....	.....	4.97
11	W	4	8	12	.....	.....	3.35	.....	.....	4.60	.....	.....	4.20
12	W	21	22	48	.....	.....	4.70	.....	.....	4.97	.....	.....	4.91
13	W	5	6	11	.....	.....	6.00	.....	.....	6.20	.....	.....	6.10
14	W	1	3	4	.....	.....	4.60	.....	.....	4.97	.....	.....	4.80
15	W	4	6	10	.....	.....	4.55	.....	.....	4.60	.....	.....	4.60
16	W	25	31	56	4.50	5.80	5.54	6.13	5.52	5.73	5.86	5.60	5.68
17	W	22	21	43	6.20	6.00	6.10	6.50	6.46	6.48	6.32	6.30	6.31
18	W	1	12	13	.....	.....	4.60	.....	.....	4.40	.....	.....	4.50
19	W	66	88	154	5.88	5.54	5.65	5.92	5.43	5.71	5.91	5.48	5.68
20	W	5	5	10	.....	.....	4.50	.....	.....	4.60	.....	.....	4.53
21	W	4	7	11	.....	.....	3.86	.....	.....	4.89	.....	.....	4.60
22	W	4	7	11	.....	.....	5.10	.....	.....	4.20	.....	.....	4.50
23	W	3	6	9	.....	.....	5.54	.....	.....	5.68	.....	.....	5.62
24	W	7	7	14	.....	.....	5.53	.....	.....	5.74	.....	.....	5.66
25	W	35	49	84	4.97	5.92	5.71	5.93	6.13	5.98	5.83	6.00	5.90
		345	542	887	.....	.....	.....	.....	.....	.....	.....	.....	.....

* The small high schools are not divided into semesters.

The full first-year high school investigation consisted of tests in algebra, composition, reading, and intelligence. In composition, as in the other three, the investigation was conducted by trained examiners only and under conditions as uniform as were possible. Every test was made in the pupils' schoolrooms during regular school sessions. In order to make the procedure uniform, a typewritten set of instructions was faithfully followed. The eager coöperation of the teachers aided the examiners in giving the pupils the impression that the exercises were a part of their regular school procedure.

In planning the composition an attempt was made to select a topic which would lend itself to narration only and which, as far as possible, would be equally stimulating to all pupils. The subject chosen was: "The most exciting ride I ever had."

The compositions were scored on the Nassau County Supplement to the Hillegas Scale.[1] The ratings were made by one experienced scorer whose reliability was tested at frequent intervals and at the end by comparing his scores on random sets of ten compositions with the median rating of ten trained scorers. As an aid in evaluating the compositions, two steps were interpolated between each two of the ten steps on the Nassau County Scale; then each composition was given that scale value to which it most nearly corresponded in quality.

Table 92 shows how the first-year high school pupils of Virginia compare in ability with the first-year high school pupils elsewhere whose compositions have been scored on the Hillegas Scale,[2] on the Thorndike Extension of the Hillegas Scale,[3] or on the Nassau County Supplement to the Hillegas Scale. It will be seen that Virginia's score is lower than eight of the fourteen other records listed, and higher than six. Virginia's score is nearly a year higher than that of the average of fifty-four high schools over the country, but more

[1] M. R. Trabue, "Supplementing the Hillegas Scale." *Teachers College Record*, January, 1917.

[2] M. B. Hillegas, *A Scale for the Measurement of Quality in English Composition*. Bureau of Publications, Teachers College, N. Y.

[3] E. L. Thorndike, *Thorndike Extension of the Hillegas Scale*. Bureau of Publications, Teachers College, N. Y.

than a year below Trabue's tentative standard for the first year of the high school.[1]

TABLE 92

Comparison of Virginia composition ability with that of other schools

Mt. Holly, N. J.*	5.08
Friends School, Brooklyn †	5.68
St. Paul, Minn.‡	5.83
Nassau County, N. Y.§	5.00
South River, N. J.§	5.18
Mobile Co., Ala., outside of Mobile City§	5.56
Mobile City whites§	6.69
Fifty-four High Schools in over thirty-five states§	4.99
Cold Springs, N. Y.‖	5.72
Woodmere, N. Y. (private school)‖	6.97
Janesville, Wis. ¶	5.99
Middletown, N. J.**	5.20
Xenia, Ohio ††	5.20
Idaho Springs, Colo.‡‡	5.55
Trabue's Tentative Standard§	6.00
VIRGINIA	5.40
Virginia White Boys	5.42
Virginia White Girls	5.54
Virginia Colored Boys	4.88
Virginia Colored Girls	5.05

* From Mt. Holly Survey, Board of Education, Mt. Holly, N. J.
† From unpublished Survey of Friends School, Brooklyn, 1919, by Professor N. L. Englehardt and others. Teachers College.
‡ From St. Paul Survey, published by St. Paul Board of Education.
§ From M. R. Trabue, "Supplementing the Hillegas Scale." *Teachers College Record*, January, 1917.
‖ From unpublished reports by the Department of Educational Administration, Teachers College, N. Y.
¶ From Janesville, Wis., Survey, State Board of Education, Madison, Wis.
** From Middletown, N. J., Survey.
†† From Xenia, Ohio, Survey.
‡‡ From an unpublished report by Superintendent C. E. Green, Idaho Springs, Colo.

[1] Trabue's tentative standard medians, by school grades, are:

	Elementary School					High School			
Grades	4	5	6	7	8	I	II	III	IV
Scores	3.5	4.0	4.5	5.0	5.5	6.0	6.5	6.9	7.2

High school conditions in Virginia prompted classification on three bases. The first is racial. Two public colored high schools in Virginia were tested, the Armstrong High School in Richmond and the Booker T. Washington High School in Norfolk. All of the first-year pupils in both of these schools were examined. The second classification is based upon the number of years in the elementary schools contributory to the high schools. Norfolk city has eight elementary grades, while all the rest of the high schools tested have but seven elementary grades. The third classification is according to location and organization. On this basis the schools are divided into city high schools, junior high schools, accredited rural high schools, and unaccredited three-year and four-year high schools. No high school offering less than three years was tested.

Table 93 gives the median scores in intelligence (Delta 2) and composition, the median chronological ages, and the median number of years spent in school for the first-year high school boys and girls of Virginia according to the three classifications.

The white pupils in Virginia high schools are better in composition than are the pupils in seven of the high schools of other states listed in Table 92, and are practically equal in ability to the white pupils of Mobile County, Alabama (outside of Mobile city). Virginia white pupils are, however, a year below the tentative standard for the first year of high school. Virginia colored pupils are a year below the white pupils and two years below the tentative Trabue standard, but their composition ability is equal to the median ability of first-year pupils in fifty-four high schools in thirty-five states. About the same relation holds for the comparative intelligence scores of the two races. The colored pupils are seven months older than the whites and have been in school about one fifth of a year longer. In both races the boys stand higher in the intelligence tests than the girls, but are poorer in composition. The boys are younger, but have been in school slightly longer.

There is a difference of only one fifth of a year between the composition abilities of pupils under the 7–4 plan and

TABLE 93

English Composition, General Intelligence. Age in years and years spent in school, first-year high school medians for 887 pupils grouped by races and school organization groups

Schools	Intelligence			Composition			Age in Years			Years Spent in School		
	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both	Boys	Girls	Both
Virginia	116.37	110.63	112.80	5.35	5.47	5.42	14.73	14.83	14.79	7.93	7.90	7.91
Virginia whites	120.00	115.50	117.20	5.44	5.58	5.53	14.69	14.71	14.70	7.92	7.87	7.89
Virginia colored	100.50	94.70	97.00	4.85	5.02	4.97	15.10	15.39	15.35	8.14	8.07	8.08
Virginia 7–4 plan	113.50	111.60	112.40	5.28	5.48	5.40	14.72	14.81	14.78	7.92	7.84	7.87
Virginia 8–4 plan	123.50	108.20	114.25	5.54	5.44	5.50	14.74	14.89	14.83	7.98	8.03	8.02
Virginia city high school whites	122.85	118.42	120.22	5.69	5.83	5.77	14.58	14.51	14.54	7.85	7.77	7.80
Virginia junior high schools	.....	.....	.....	5.02	5.33	5.28	14.60	14.78	14.71	7.95	7.87	7.93
Virginia accredited high schools not in cities	117.00	112.20	114.25	4.71	5.15	4.97	15.63	15.04	15.11	7.91	7.86	7.87
Virginia unaccredited three- and four-year high schools	106.30	107.40	106.90	5.04	4.97	4.99	15.25	15.21	15.23	8.12	8.21	8.18

those in the 8–4 scheme. This difference is consistent with the closeness of ages and the number of years spent in school. In composition, in intelligence, in age, and in attendance the distinction between the 7–4 system and the 8–4 system is one in name only. This may not disprove the contention that for composition, pupils can in seven years meet the high school requirements that they are commonly allowed eight years to satisfy, but it does argue that unless such a shortening of the course is accompanied by an appropriate internal readjustment, the 7–4 plan will remain practically an 8–4 process, but with the handicap of poor grade classification.

In composition the city senior high schools for corresponding grades rank two thirds of a year better than the junior high schools and almost one and one fourth years ahead of the rural accredited and the unaccredited three-year and four-year high schools. The lowest scores are made by the rural accredited schools, which, however, rank practically as high as the fifty-four high schools throughout the country. The unaccredited Virginia high schools rank exactly equal to the fifty-four high schools, but are just two years below the tentative first-year Trabue standard. The pupils in rural and unaccredited schools are a half year older than the city and junior high school pupils. The pupils in unaccredited high schools have been in school three and one half months longer than pupils in the rural accredited high schools or the city high schools, and two and a half months longer than the junior high school pupils. The rural pupils have attended school the same length of time that the city pupils have and score slightly higher in intelligence. The pupils in unaccredited schools have been in school longest and score lowest in intelligence. In the main, ability in composition is directly proportional to intelligence and indirectly proportional to age and to years spent in school.

Tables 94 and 95 show the distribution of 733 white pupils and 154 colored pupils in the first year of high school according to age and achievement in composition. Tables 96 and 97 give the distribution of 695 of the same pupils according to achievement and years in school. In general, for any

TABLE 94

English Composition. Distribution and median scores according to age-achievement for Virginia first-year high school pupils, white

Age	Scores							Total	Per Cent	Median Score
	1.9	2.8	3.8	5.0	6.0	7.2	8.0			
11½	.....	.....	.....	.....	1	.....	.....	1	0.13	6.00
12	.....	.....	.....	.....	1	.....	.....	1	0.13	6.00
12½	.....	.....	1	1	4	4	.....	10	1.36	6.33
13	.....	1	3	7	13	1	.....	25	3.41	5.63
13½	.....	1	6	22	36	4	1	70	9.55	5.68
14	1	3	16	23	70	16	.....	129	17.60	5.84
14½	.....	4	15	42	75	8	.....	144	19.62	5.66
15	.....	10	18	40	49	11	.....	128	17.45	5.39
15½	.....	3	13	29	34	4	.....	83	11.43	5.37
16	1	7	9	26	19	1	.....	63	8.60	5.01
16½	2	5	6	11	10	5	.....	39	5.32	5.05
17	.....	1	7	7	6	1	.....	22	3.00	4.87
17½	.....	.....	7	3	.....	.....	.....	10	1.36	4.09
18	.....	2	.....	2	1	.....	.....	5	0.68	3.58
18½	.....	.....	1	1	.....	.....	.....	2	0.27	4.40
19	.....	.....	.....	1	.....	.....	.....	1	0.13	5.00
Total	4	37	102	215	319	55	1	733	100.04	5.53
Per cent	0.55	5.05	13.92	29.33	43.52	7.50	0.13	.....	100.00	.....
Median age	16.25	15.23	15.03	14.91	14.48	14.41	13.50	14.70	.....	.....

given grade the older the pupil, the lower his ability in composition, while the lower his achievement, the longer he has been in school. Here again is displayed an urgent need for reorganization of curricula and courses of study. In one city high school, pupils in the same class ranged almost evenly from 1.9 to 7.2 in composition. Other schools had nearly as wide ranges, and in schools of all classes ability was widely distributed. Until conditions are made more flexible, until pupils are differentiated according to their abilities and aptitudes, and until children are promoted by subjects, many of the poorer students are going to be shamed out of school and the better ones denied the opportunity to excel.

TABLE 95

English Composition. Distribution and median scores according to age-achievement for Virginia first-year high school pupils, colored

Age	Scores						Total	Per Cent	Median Score
	1.9	2.8	3.8	5.0	6.0	7.2			
11½	.....	.....	.....	1	.....	.....	1	0.65	5.00
12	.....	.....	.....	1	.....	.....	1	0.65	5.00
12½	.....	.....	.....	1	2	.....	3	1.95	5.78
13	.....	.....	1	5	4	.....	10	6.48	5.28
13½	.....	.....	.....	4	3	.....	7	4.54	5.36
14	.....	.....	4	4	2	.....	10	6.48	4.68
14½	.....	.....	6	6	7	.....	19	12.33	5.04
15	.....	2	3	8	8	.....	21	13.64	5.16
15½	.....	2	7	8	8	.....	25	16.23	4.88
16	1	.....	1	5	5	2	14	9.09	5.50
16½	.....	2	4	7	7	.....	20	13.00	5.03
17	.....	1	6	2	1	.....	10	6.48	4.03
17½	.....	3	3	2	1	.....	9	5.84	3.85
18	.....	1	.....	1	.....	.....	2	1.30	3.90
18½	.....	.....	.....	1	.....	.....	1	0.65	5.00
19	.....	.....	1	.....	.....	.....	1	0.65	3.80
Total	1	11	36	56	48	2	154	99.96	4.97
Per cent	0.65	7.14	23.40	36.40	31.20	1.30	.....	100.09	.....
Median age	16.00	16.50	15.54	15.13	15.13	16.00	15.35	.....	.....

To emphasize this present condition in Virginia, two compositions written by members of the same class are here reproduced. The first is one of the poorest themes received during the state survey; the second is the best. If these compositions are fair samples of their authors' abilities, by only a generous interpretation can these two pupils be called classmates.

SAMPLE 1

The Most Exciting Ride I Ever Had

The Most exciting ride that I had was the day after the armest was signe, And it was the best .I had and the one I

TABLE 96

English Composition. Distribution and median scores for first years in school, and composition scores for 154 Virginia first-year high school students, colored.

Years in School	Scores							Total	Per Cent	Median Score
	1.9	2.8	3.8	5.0	6.0	7.2	8.0			
5	....	....	.....	1	.....	....	...	1	0.65	5.00
5½	....	....	.....	1	.....	....	...	1	0.65	5.00
6	....	....	.....	3	2	....	...	5	3.24	5.32
6½	....	....	1	2	2	....	...	5	3.24	5.23
7	....	....	4	5	7	....	...	16	10.40	5.28
7½	....	....	3	10	9	1	...	23	14.94	5.34
8	....	2	10	15	12	....	...	39	25.32	4.95
8½	1	1	2	3	5	....	...	12	7.79	5.13
9	....	3	11	10	6	....	...	30	19.50	4.51
9½	....	....	1	2	1	....	...	4	2.59	4.95
10	....	2	1	5	3	....	...	11	7.14	4.95
10½	....	....	.....	.....	.....	....	...	.....	.....	.....
11	....	3	1	1	.....	....	...	5	3.24	3.14
11½	....	....	.....	1	.....	....	...	1	0.65	5.00
12	....	....	1	.....	.....	....	...	1	0.65	3.80
Total	1	11	35	59	47	1	...	154	.....	4.96
Per cent	0.65	7.14	22.73	38.31	30.52	0.65	...	.....	.....	.....
Median years in school	8.50	9.17	8.23	8.00	7.90	7.50	...	8.08	.....	.....

lik the best, the truck that we were riding in, look lik it was go to strick the one in front of it every minute.

The truck moved on isd the noise of the people, that were on the street making ever kind, of nous that they could make with there hones, and other thing that they had, and this is the Exciting and best that I had for a longe time.

SAMPLE 2

The Most Exciting Ride I Ever Had.

One day last summer some friends induced my family to allow me to go to Fredericksburg with them in their automo-

TABLE 97

English composition. Distribution and median scores for first years in school, and composition scores for 541 Virginia first-year high school students, white.

Years in School	Scores							Total	Per Cent	Median Score
	1.9	2.8	3.8	5.0	6.0	7.2	8.0			
4	...	....	.....	.....	.....	1	....	1	0.18	7.20
4½	...	....	.....	.....	.....	....	....	.....	.....	.....
5	...	1	.....	1	3	1	....	6	1.11	5.87
5½	...	....	1	1	3	....	....	5	0.92	5.68
6	...	....	.....	4	16	2	....	22	4.07	5.98
6½	...	....	2	2	7	....	....	11	2.03	5.74
7	...	2	10	22	55	14	....	103	19.04	5.85
7½	...	1	5	16	30	5	....	57	10.54	5.74
8	...	15	40	71	101	12	1	240	44.36	5.41
8½	...	2	2	11	8	1	....	24	4.44	5.20
9	...	4	8	22	13	4	....	51	9.42	5.08
9½	...	....	.....	1	1	1	....	3	0.55	6.05
10	...	1	5	6	3	2	....	17	3.14	4.86
10½	...	....	1	....	.....	....	....	1	0.18	3.80
Total	...	26	74	157	240	43	1	541	.....	5.56
Per cent	...	4.81	13.68	29.02	44.36	7.95	0.18	.....	.....	.....
Median years in school	...	8.05	7.99	7.98	7.78	7.60	8.00	7.89	.....	.....

bile. Fredericksburg is a little town nestling among the hills of Virginia and is about two hundred miles from Norfolk. We started early on a bright morning in June. After traveling all day we reached Richmond just as twilight softly enfolded the world. We were very tired and not a little crestfallen because we had hoped to reach Fredericksburg by four o'clock, and here it was almost night and we were still seventy miles from our destination. It was a wonderful night with a soft scented breeze playing over the earth, and as the road before us was concrete we decided to drive on and try to reach Fredericksburg that night.

Half way between Fredericksburg and Richmond is a long,

winding hill that slopes gently down to a large stream which is spanned by a bridge. We reached the hill and coasted slowly down. The road before us stretched like a white ribbon except in some places where tall trees bent over and formed shadows. Turning a bend in the road we saw on one side of the road a large camp fire brightly gleaming and just beyond the waters of the stream murmered among the rushed. We were going very slowly and just as we were opposite the fire a single command rang out in the silent woods — "Halt"! Our car stopped and was surrounded by soldiers. The leader explained that they were a company of soldiers marching south and when attempting to cross the bridge with a crash the bridge had broken and two men in two large trucks had been hurled into the sullen waters beneath. One was killed; the other was rushed back to Fredericksburg.

While he was speaking the sky above had turned an angry black, and just as he concluded a streak of lightning darted across the heavens and was followed by a deep crash of thunder. The very earth seemed to shake as crash after crash of thunder tore across the heavens. Aroused by the fury of the tempest the wind broke forth and like a cyclone tore through the trees.

We turned and reached Richmond a little after mid-night, cold, wet and tired.

The next day was beautiful so we rode on and reached Fredericksburg.

CONCLUSIONS

1. In so far as a single test is indicative, this investigation shows that the first-year high school pupils of Virginia compare favorably in composition ability with pupils from fifty-four high schools in thirty-five states, but are a little below the rural pupils reported for one county in Alabama. Virginia is below most of the tested cities of other states and more than a year below the tentative standard (Trabue) for the first year of high school.

2. In intelligence, in composition, in age, and in years spent in school, the distinction between the 7–4 system and the

8–4 system is at present only nominal. Until there is a reorganization of the course of study, subject-matter, and methods, Virginia will practically have only an 8–4 system handicapped by poor grade classification.

3. In every kind of high school there is almost a maximum range of composition ability within the class. There are difficulties in the way of preventing this condition in the smaller schools; but in the larger ones differentiation by grades or class-sections and promotion by subject call urgently for recognition, that such equal opportunity may be provided as alone can make education worthy of a democracy.

4. The poorer samples of composition reveal a lack of mastery of the fundamental principles of language use. There is frequently an overemphasis of grammar and rhetoric at the expense of the simple, underlying rules of ready expression. These conditions thwart the primary and most essential principle of composition, conscious mastery and unfailing recognition of the sentence, and the proper indication of it in speech and in writing. The essential means of achieving this sentence sense are few, and they are vital.

5. Poor spelling and punctuation and lack of clearness due to an indefinite sentence recognition comprise the chief weakness among the inferior pupils. The better compositions reveal excellent ideas, but here again the authors have apparently been stocked with relatively minor precepts at the expense of those simple rules of expression which give clearness and force, and which enable writers to adhere to their themes.

6. The lack of a proper sense of values has so distorted emphasis that frequently pupils have devoted a page to irrelevant details leading up to their stories, and three lines to the incident. Ideas are sometimes so poorly organized that every sentence is a paragraph.

7. The abundance of ideas, vividness of imagination, and ingenuity of phrasing sometimes manifested by colored pupils are frequently rendered ineffective by poor spelling, desultory thinking, and fragmentary, incoherent expression. They fail to carry thoughts through to their conclusions, and the words composing the fragments of thoughts are sometimes so badly

misspelled that even their context fails to make the ideas intelligible.

8. There is no uniformity and little neatness and orderliness among Virginia pupils in the preparation of manuscripts. There are a few standards which teachers of composition may reasonably demand that their pupils meet.

9. There are no weaknesses in composition among the first-year high school pupils of Virginia which cannot be strengthened. The teachers of the state need to realize these weaknesses, that they may launch an organized campaign for improvement. There is on the part of both teachers and pupils an attitude towards English composition which, if fostered and made to function, can result in pronounced improvement.

RECOMMENDATIONS

The most urgent prescription for Virginia teachers of composition is a concentration upon the essentials of language, even at the expense of formal grammar and polished rhetoric. There is no economy in teaching the rules of finer technique when the fundamental principles of expression are strange. Those principles should be selected first which every pupil needs to master, *and has not mastered,* in order to be a useful citizen. These principles should then be presented in the order and manner which will most profit a pupil, however long he may remain in school.

English teachers are urged to consult thoughtfully the series of reports on the economy of time which have appeared recently in the *English Journal.*[1] It is also recommended that every teacher of English study the "Report of the National Joint Committee of the Commission on the Reorganization of Secondary Education and the National Council of Teachers of English."[2]

As a medium for simple language practice, pupils should be encouraged to speak and write about those subjects whose

[1] "Reports to the National Council of Teachers of English on Economy of Time." *English Journal* for February, March, and November, 1919. University of Chicago Press, Chicago, Illinois.

[2] "Reorganization of English in Secondary Schools." Bureau of Education Bulletin, 1917, No. 2.

intimacy and interest arouse an eager desire for expression. Grafted interest tends to create artificial attitudes and labored phrasing. Oral practice on topics of spontaneous concern encourages simplicity and ease of expression, and permits prevision which forestalls many of the faults that would otherwise creep into the written draft.

Teachers should demand that pupils carry every thought through to its logical conclusion and then express that thought completely. This will go far toward perfecting a sentence sense.

Composition teachers are recommended to visit other composition teachers in their own school and composition classes in other schools to learn new practices and to gain sympathy and perspective. An exchange of compositions is advised, that teacher and pupils may appreciate common principles and problems. This practice will furnish an incentive to intercommunication.

To gain a more definite estimate of the ability of pupils and to follow their progress more confidently, it is recommended that scientific tests be given in composition. Only by measuring a pupil's achievement at intervals can his improvement be known. By measuring this improvement upon established standards teachers all over the state can grade upon the same basis.

That teachers and pupils may become acquainted with the purposes and use of composition standards and with current pupil achievement and growth, a scale in composition has been devised from themes written by Virginia pupils and is presented in the following pages in the hope that it may show what is being done and set higher standards for future accomplishment.

Virginia Supplement to the Hillegas Scale for the Measurement of Quality in English Composition[1]

In the belief that a scale composed of local specimens will arouse more educational interest and effort among Virginia teachers and pupils of composition than would standards which have been made from compositions written by pupils in other parts of the country, the following supplement to the Hillegas Scale[2] is appended.

This scale is based upon the judgments of ninety-six teachers of composition, most of whom had had considerable experience with composition standards, and all of whom had just had two weeks' intensive training at Teachers College, New York, in the use of the Nassau County Supplement to the poorest to the best, were selected from those written by the Hillegas Scale.[3] One hundred compositions, ranging from first-year high school pupils during the Virginia State Educational Survey. These were faithfully reproduced in mimeographed form, the specimens shuffled, and then scored by ninety-six composition teachers, with the Nassau County Scale as a basis of evaluation. The values accompanying the specimens here printed are the median judgments of the ninety-six scorers.

The Virginia Supplement examples[4] were selected for publication without knowledge of the high schools from which they came. These specimens were used because they happened to represent values[5] which marked equal and desirable steps.

[1] *Hudelson English Composition Scale*, published by World Book Company, Yonkers, New York.

[2] M. B. Hillegas, *A Scale for the Measurement of Quality in English Composition*. Bureau of Publications, Teachers College, New York City.

[3] M. R. Trabue, "Supplementing the Hillegas Scale." *Teachers College Record*, January, 1917.

[4] The first eleven specimens, values 2.0 to 7.0, are Virginia compositions. Samples 7.5, 8.0, 8.5, and 9.5 are selected from Professor E. L. Thorndike's *English Composition — 150 Specimens Arranged for Use in Psychological and Educational Experiments*, Bureau of Publications, Teachers College, New York City. The values there assigned are used here. Example 9.0 is chosen from the Thorndike Extension to the Hillegas Scale, with the value there assigned. Samples 9.0 and 9.5 are the only specimens in this supplement not written by school children.

[5] The values denoted on the scale are accurate enough for all practical purposes. The exact medians are: 2.067, 2.50, 3.00, 3.557, 4.028, 4.509, 5.062, 5.933, 6.50, 7.016, 7.50, 8.00, 8.50, 9.00, and 9.50.

The compositions printed here may be above or below the representative abilities of the schools from which they came, for it has been shown[1] that there is a wide range of ability within composition classes in Virginia.

The values on the Virginia Supplement should be identical with those on the Nassau County Supplement; consequently the observations and conclusions drawn in the high school composition report of the Virginia State Survey may be applied to the Virginia Scale.

In using the scale, a composition should be assigned the value of the specimen on the scale to which it most nearly corresponds in general quality.

This scale is not intended to improve writing ability. It is designed as an instrument for measuring achievement. By helping to diagnose conditions it will aid the teacher in prescribing remedies.

SAMPLE 1

Value, 2.0

The Most Exciting ride I ever had.

The Most exciting ride I ever had was a Hay ride, it was early in the morning when we went out on the hay ride it was quite a injoyable trip every one seemed to be so cheerfully the rode that we were traveling on it was very hilly on of the parties took sick and far a little while no one did not think that the Girl was as sick as she was all at once she comme mence comeplainning so she arroused every ones curosity we found out that the girl were verry ell thought she was going to die.

SAMPLE 2

Value, 2.5

The Most Exciting Ride I Ever Had

One dag Friends I decided to go car riding my friend and myself started. We was going arround a sharp curve and another car was coming toward us the driver did not know what to do. The road was so narrow we couldn't stop. So

[1] See p. 199.

the other car ran into us and truend us over the bank. and it hurt three of my frimses very bad.

SAMPLE 3

Value, 3.0

The Most Exerciting I ever Had:

The most exerciting ride I ever had was When I was on my way to Petersburg. It was one Sunday Morning and two car's full of people went to Camp Lee and I was with in the crowd the car I was in was a Cadalic 8 and a very small boy was driving it, we were runing very fast when we meet a small car and We had a great conclusion our car tore the small one all to pieces and kill three people whom were in it,

We tood the dead bodies and the man who was not killed on to Petersburgh with us and there found out who they were. We enjoyed the day hugely even if we did have a tirrible wreck:

SAMPLE 4

Value, 3.5

The Most Exciting Ride I Ever Had

Summer before last my sister was going to see her girl firend, she lived out in the country, forty miles from here. we had a car, so my brother sid he would take her out there and I could go with them, we ask daddy if he cared and he, said no,

So that night about seven thirty we left home, and went by town to get some gasoline. then we left for the country, we got out of town the roads were very bad at first, but we went on. we forgot the way out there so we ask someone how we could get there, they told us, so we kept on, the roads were gradually getting better. we got half of the way, then we ask some one else to direct us to the road to take, they did, we went on as they told us, we got out in the country on the wrong road, but we did not know it until we ask some one. then brother got mad and jercked the car from one side of the road to the other. I didn't think we were ever going to get

there or anywhere else alive. we turned around and went, back, and took the right road. and got there about twelve oclock. that night.

SAMPLE 5

Value, 4.0

The Most exciting Ride I ever had.

It was just after a very hard rain. and the Roads were slippery and muddy. My old friend and I honomed a car and started out for a spin. We hadn't gone far before we saw that the Road swere in no condition for motoring. We kept going thought and never stopped for nothing that morning. Along about the middle of the evening wa saw just ahead of us a lantty slaping hill. We though we could make it all right so we started thourgh when we reached the middle of the clay hill we couldn't go any further we tried and tried to get out of the place but all in vain. So we had to get down and go all the way home on foot. We sent for car the next day and some one had took all the tires we had on the car. We soon had her right again and ham ben ridding on her sence then.

SAMPLE 6

Value, 4.5

The Most Exciting ride I ever had.

One day my brother took me to Richmond in his racer. We did not go fast zoing down. We spent two day in Richmond. We had a good time there.

When we started back my brother said he was going to run fast, which he did.

We were going along about 40 mile an hour, when, coming around a short carne we saw another car coming at an equal rate of speed. We missed him by about six inches.

After that the road was stright and the speedometor showed that we were going seventy five mile a hour.

We arrived here just one hour and a half from the time we left Richmond.

SAMPLE 7

Value, 5.0

The Most Exciting Ride I Ever Had.

It was the afternoon of a day in July that we started off in an automobile to go to a place about twenty miles away.

Before we had gotten half way something happened to the engine and we couldn't go very fast.

We had nearly gotten to the place where we were going when another car with negroes in it got across the road and wouldn't let us pass. They pulled out their pistols, and one shot, but he did not hit anyone.

He was just coming over to our car when the sheriff happened to come along, and he took the two men and carried them away with him, and we went on our journey.

It is very exciting to have anyone to hold you up on the road and I think you will find it out if you ever have anyone to hold you up.

SAMPLE 8

Value, 5.5

The Most Exciting Ride I Ever Had.

One afternoon about five o'clock, a car with three boys and two girls stopped in front of my house and asked me to go rinding.

When we reached a narrow place in the road at a corner, another car was coming towards us but we didn't know it until we were about three feet away from that car. Both cars were going very fast and if the brakes hadn't been in good order, we would never have gottened home alive. The two cars hit each other and we were thrown out of our seats. It didn't really hurt us but we were so scared we thought we were hurt. Then we backed out of that narrow place and let the other car go on. In a few minutes we were on our way again. The boy that was driving the car never again tried to speed and we were late getting home that night.

SAMPLE 9

Value, 6.0

The most exciting ride I ever had.

The most exciting ride I ever had was when we first got our Pony. One day we started out, and he did very nicely for a while, until he saw a automobile and then the fun began. He tried to turn around right in the road, and when he found that he could not he started to run. There were only two of us in the cart, my brother and myself and neither were very strong. But we pulled back on him for all we were worth, but he seemed to go faster instead of stopping.

After a while the Pony seemed to be getting tired, so he slowed down and was soon alright. We then began to laugh and thought we had had a fine ride and all the excitement that we had been wishing for.

SAMPLE 10

Value, 6.5

The Most Exciting Ride I Ever Had.

It was a beautiful afternoon in September. The air was crisp and bracing and I thought it an excellent time for a bicycle ride with my chum, so I immediately went after her.

We started off in the best of spirits, but we had hardly reached the bridge when our spirits fell rather suddently. We heard a *very* familiar sound behind us and upon looking back we saw just what we expected, my father's bull, coming on close behind us. The attraction for the bull seemed to be our red ties so we pullled them off as we rode and let them fly; but alas! Mine caught on the back of my bicycle and the bull was so near that it was impossible to stop to tak it off, so I exerted all my energy in getting over that bridge.

I had never imagined that a bridge could possible be so long as that one seemed and it seemed I scarcely touched the bridge eitheir as I crossed it but finally in some manner we reacher the opposite shore and got into a place of safety.

SAMPLE 11

Value, 7.0

The Most Exciting Ride I Ever Had.

Near the little town I lived in was an Aviation Field. Each day many people could be seen standing in the streets watching the aeroplanes for it was all very new to us. And on West Street, my street, you could always find children building and imitating the strange new things that seemed to hold such a fascination for us. I was usually among them, too, for I hoped that some day I could ride in a real one.

One bright Spring afternoon all of us were at our daily tasks of making the miniature airships. It was great fun and all of us were enrapted in our work when the unexpected happened. Hearing familiar noises over our heads we looked up to see several of our objects of imitation "looping the loop". We had never seen them do this before and all of us screamed with fright thinking that the aeroplanes were falling. But after a while we calmed down, seeing that nothing happened, and to our great delight one of the aviators came down and landed in the field back of my house.

I ran to see what he wanted and found that it was gasoline, so I put on my cap and hurried to the next block bringing a man and a great deal of gas with me. The aviator was a very nice man and asked me if I didn't want to go up with him. I consented of course and then followed the most delightful adventure I ever had. High up in the air we went, and so high that I could not see my playmates.

It was the most exciting ride I have ever had or ever expect to have and I shall never forget it.

SAMPLE 12

Value, 7.5

Westward Ho!

About ten years ago father bought a large ranch up in the northern part of Minnesota. We were all eager to go to this ranch, so he also bought a fine horse which we called

Prince, and a double-seated buggy. We were to drive up. The day of our departure drew near, and about three o'clock, one lovely morning, mother awakened me and told me to hurry as we wanted to start in an hour. I was up and dressed in a few moments and hurried through breakfast. In half an hour we were ready to start. I had never seen so beautiful a morning. The sun was just showing its great golden face over the horizon. The birds were popping up out of their nest, and all the world seemed to awaken to their thrilling songs. We rode all that day, stopping only for food and drink, and to let the horse rest. So we went on for a week, having the most delightful ride and the best time I have ever spent. One morning about ten o'clock we arrived at our destination, all tired out, but happy. And though other occurrences on the drive have been blotted out of my mind, that one morning when all the world seemed glad will forever be fresh in my memory.

Value, 8.0

SAMPLE 13

The Three Islands.

Among the beautiful islands on the Canadian side of the St. Lawrence River, there is a deep and narrow channel which separates three small wooded islands from a large fertile one. Of the three islands the largest is rocky and covered with a growth of stately pines and waving hemlocks, and a carpet of moss and ferns. On the second there is quite an assortment of trees, whose foliage during the fall turns to many shades of gold and red, which colors are greatly enhanced by the dark green background of its neighbor. On the third there is a thick growth of brush, with an occasional small tree. These three islands are so close together, that fallen trees and logs make it possible to walk from one to another.

Value, 8.5

SAMPLE 14

Deephaven.

Deephaven is a forlorn and quiet little seaside town in New England As we walked about its silent streets, even the

houses seemed asleep. In the chill November air, the dry grass of the near-by marshes crackled faintly and drearily, while in low places the shifting ice creaked and groaned. Even the tall cedartrees seemed as if they gave neither shade in summer nor shelter in winter, but stood uncompromisintly siff and straight, as if they could only battle against the wind that threatened to tear them from the hills. The oak-trees still held fast to their dry leaves which made a mournful rustle as the wind swept through the branches.

The lonely landscape reflected the desolate life of the dwellers in Deephaven. The only cheerful in the picture was the presence of a few brave pansies lifting bright faces from under the shelter of some tall stalks of china-aster. As we picked the dainty things we felt a touch of compassionate tenderness even for Deephaven.

Value, 9.0

SAMPLE 15

The Hunted Deer.

The courage of the panting fugitive was not gone; she was game to the tip of her high-bred ears; but the fearful pace at which she had just been going told on her. Her legs trembled, and her heart beat like a trip-hammer. She slowed her speed perforce, but still fled industriously up the right bank of the stream. When she had gone a couple of miles and the dogs were evidently gaining again, she crossed the broad, deep brook, climbed the steep left bank, and fled on in the direction of the Mt. Marcy trail. The fording of the river threw the hounds off for a time; she knew by their uncertain yelping, up and down the opposite bank, that she had a little respite; she used it, however, to push on until the baying was faint in her ears, and then she dropped exhausted upon the ground.

Value, 9.5

SAMPLE 16

Niagara Falls.

Oh that I had never heard of Niagara till I beheld it! Blessed were the wanderers of old, who heard its deep roar

sounding through the woods, as the summons to an unknown wonder, and approached its awful brink in all the freshness of native feeling. Had its own mysterious voice been the first to warn me of its existence, then, indeed, I might have knelt down and worshipped. But I had come thither, haunted with a vision of foam and fury, and dizzy cliffs, and an ocean tumbling down out of the sky — a scene, in short, which nature had too much good taste and calm simplicity to realize. My mind had struggled to adapt these false conceptions to the reality, and finding the effort vain, a wretched sense of disappointment weighed me down. I climbed the precipice, and threw myself on the earth feeling that I was unworthy to look at the Great Falls, and careless about beholding them again.

CHAPTER XII

ELEMENTARY ALGEBRA

IN most of the high schools of the country, algebra has received very considerable emphasis, and commonly it has been made one of the two most important studies in a first-year pupil's program. In Virginia high schools algebra is a basic subject in all first-year programs. As a part of the examination of high school work in Virginia, the Hotz Algebra Tests[1] were given to almost a thousand white and colored children in all of the schools where the English composition test was employed.

Two of the Hotz Series A tests were used. In all 811 white and 77 colored children were given the addition and subtraction test, and 714 white and 77 colored children were given the equation and formula tests. All the tests were administered during the latter part of May by members of the survey staff, and the papers were scored, in accordance with the published directions, by the author of the tests, Dr. Hotz, then professor in William and Mary College.

In Table 98 may be seen the results for addition and subtraction. This table shows the results for three groups of pupils, those who had studied algebra three months, those who had studied it six months, and those who had studied it eight months. The data are given in the form of the distribution of pupils for each of these groups in terms of the number of problems correctly solved, and in addition the median scores for each of the several groups are given. In the right-hand column of the table may be found the Hotz medians for these three groups.

It is obvious from the table that in no one of the three groups do the Virginia schools equal the Hotz standards. In fact, the Virginia children who had studied algebra for six months make only .4 better score than the Hotz standard for those who have studied algebra for three months. The Virginia children who had studied algebra for eight months make even a less satisfactory record.

[1] Henry G. Hotz, *First Year Algebra Scales*. Bureau of Publications, Teachers College, Columbia University, 1918.

In Table 99 the results for the equation and formula tests are given in the same manner. The table shows approximately 100 fewer children than does Table 98. Practically all of these 100 children were unable, according to their instructors, to take the equation and formula test because they had not received instruction in those processes. A comparison of the Virginia medians for the pupils who were able to take this test and the Hotz standard scores given in the right-hand column of Table 99 indicates again a distinctly poor quality of work on the part of Virginia children. As in the case of the addition and subtraction tests, the children who had studied algebra for eight months fall the farthest from the proper grade scores.

In Table 100 the records for the Booker T. Washington school (colored) in Norfolk are given. Seventy-seven first-year children in this school took the algebra tests; forty of these children had studied algebra for three months, and thirty-seven of them had studied algebra for six months. In the case of the addition tests the median scores for each of the two groups are approximately one half of the amount of the standard score. In the equation and formula test the three-months group made about one third the standard score, and the six-months group less than one fourth of the standard score. A comparison of these scores with those of the white schools indicates a distinctly inferior achievement on the part of the colored children.

In order to study the type of work being done in the several high schools, the data given in Tables 98 and 99 are rearranged according to the different types of schools tested. The data as thus rearranged are given in Table 101 for addition and subtraction, and in Table 102 for equation and formula.

The children who had studied algebra three months were found in two types of schools, the junior high schools with 137 pupils in one group, and the small accredited high schools with 151 pupils in another group. The table shows that the junior high schools gave a distinctly better product than did the accredited high schools in question. But in neither case did the scores equal the Hotz standards for the three-months groups.

TABLE 98

Algebra, Hotz Series A, addition and subtraction; 811 white pupils, first year high school. Distribution, median score, and Hotz standards. Arranged according to time algebra had been studied, three, six, and eight months, respectively

Time Studied	Number Making Score												Number Tested	Median Score	Standard Score
	0	1	2	3	4	5	6	7	8	9	10	11			
Three-months group....	2	18	76	64	52	51	21	4	....	....	....	....	288	3.8	5.0
Six-months group.....	2	6	17	33	41	55	41	28	16	2	1	1	243	5.4	6.8
Eight-months group.....	2	5	37	35	52	64	30	30	10	7	5	3	280	5.1	7.5*

* Calculated from six and nine month medians.

TABLE 99

Algebra, Hotz Series A, equation and formula; 714 white pupils, first year high school. Distribution, median score, and Hotz standards. Arranged according to time algebra had been studied, three, six, and eight months, respectively

Time Studied	Number Making Score												Total Tested	Median Score	Standard Score
	0	1	2	3	4	5	6	7	8	9	10	11			
Three-months group....	38	20	13	42	57	71	9	2	1	....	....	....	253	4.2	4.8
Six-months group.....	11	14	9	16	30	29	26	12	12	13	7	....	179	5.3	7.1
Eight-months group.....	28	22	13	22	52	55	45	24	18	3	....	....	282	5.1	7.6*

* Calculated from six and nine month medians.

TABLE 102

Algebra, Hotz Series A, equation and formula; 714 white pupils, first year high school. Distribution, median scores, and Hotz standards arranged by type of school

Type of School	Number Making Score												Total Tested	Median Score	Standard Score
	0	1	2	3	4	5	6	7	8	9	10	11			
Three months group:															
Junior high schools	1	5	5	19	21	45	5	1	....	....	....	....	102	5.0	4.9
Accredited high schools	37	15	8	23	36	26	4	1	1	....	....	....	151	3.7	4.9
Six months group:															
Nonaccredited high schools	6	7	2	1	3	....	1	....	....	....	....	....	20	1.6	7.1
Rural accredited high schools	2	1	5	3	17	7	5	1	2	....	....	....	43	4.6	7.1
City accredited high schools	3	6	2	12	10	22	20	11	10	13	7	....	116	6.1	7.1
Eight months group:															
Nonaccredited high schools	7	5	2	6	10	6	2	....	1	....	....	....	39	3.9	7.6
Rural accredited high schools	2	3	1	....	7	14	9	3	9	....	....	....	48	5.8	7.6
City accredited high schools	19	14	10	16	35	35	34	21	8	....	....	....	195	5.1	7.6

The six-months groups were divided into the following subdivisions: small nonaccredited high schools, rural accredited high schools, and city accredited high schools, with 32, 43, and 138 pupils respectively. The median scores for these several groups in every case fall distinctly below the Hotz standard for children who have studied algebra for six months.

The nonaccredited schools score the lowest of all, scoring 4.3 as against a 6.8 standard. The rural accredited high schools scored 5.2 and the city accredited high schools 5.6.

The showing for the eight-months group is even less satisfactory than that of the six-months group for every type of school concerned, the nonaccredited high school standing lowest of all and not much over one half the standard score, scoring 4.9 as against a standard of 7.5. This, as a matter of fact, is less than the standard score for the three-months groups. In the equation and formula test, the results of which are shown in Table 102, the twenty children in the nonaccredited high school who have studied algebra for six months scored only 1.6, or a little more than one fifth of the standard score for this group. The rural accredited high school did distinctly better, but still did but little more than one half of the standard score, while the best city schools, which scored the highest in this test of any group, still fell one full problem short of the standard score. Curiously enough, the 282 children who had studied algebra for eight months did not do so well as the 116 city children who had studied algebra for six months. The only group which in this test made a showing at all creditable in view of the standard score was the junior high school group of 102 children.

It may be said in extenuation of the inferior achievement of the Virginia schools that the children tested may not fairly represent all of the Virginia high school students. The degree to which this objection holds is not determinable from our present data, but before the schools were selected for testing, judgments were obtained from members of the State Department of Education and from others familiar with the school conditions throughout the state as to the represen-

tative character of the high schools included, and prior to the giving of the tests there was no intimation on the part of anybody that the results would not be representative. The total number of pupils is somewhat too limited to permit any broad generalizations. The indications are, however, that algebra is poorly taught in the schools tested, and, if these are representative of the state as a whole, then it is a safe conclusion that Virginia children are not learning the fundamentals of algebra even to a fair degree of satisfaction. In numerous schools, and even in whole groups of schools, the results are so poor as to indicate that the time spent on algebra is practically wasted. In but few schools, and these always the better organized, is the algebra product satisfactory. In the junior high schools the results are uniformly of high quality. There is little difference between the accredited rural and accredited city high school, but the small nonaccredited high schools are simply not teaching their children the fundamentals of algebra, however much glory they may get out of the advertisement which an algebra course gives them.

It is true that the standard scores for the Hotz tests were derived from the high schools in which the students had had eight years' previous training in the elementary grades, and the additional year in the elementary school may have allowed the children a higher level of mental development, so that they were more capable of doing the algebra work. Virginia, however, should not take refuge in this fact, since their 7–4 organization assumes that they are doing the elementary work in seven years. It is more probable that the low results are due to bad methods of teaching and irregular emphasis upon algebraic facts and processes.

Two suggestions may be made for the improvement of the high school work in algebra: first, there undoubtedly should be very distinct improvement in the technique of teaching the subject; and, second, it is altogether probable that the Virginia schools could profit greatly by providing more extensively than has yet been done anywhere in the state an introductory course in so-called general or unified mathematics.

INDEX

Achievement of pupils, summary of, 10.
Addition, emphasis on, in Richmond schools, 138; Woody Scale for measuring, 134.
Addition scales, as bases for classification of pupils, 134.
Ages of pupils, 22, 24, 28; as basis for grouping of pupils, 114; individual ages and progress in reading, 39.
Aims of elementary instruction, 1.
Algebra, achievement of different types of schools in, 225; general summary of achievement in, 13; giving and scoring of tests in, 223; Hotz test in, 223; results of addition and subtraction tests in, 223; results of tests in, 223.
Arithmetic, achievement of colored children in, 11; achievement of Harrisonburg in, 57; achievement of one-, two-, three-, and four-teacher schools in, 60, 62; arithmetical reasoning, 67; as one aim of elementary instruction, 1; conditions chosen for the testing in, 53; data used in presenting results of, 53; Delta 2 used as test in, 53; general conclusions from results in, 68; grade results of different cities compared with Haggerty, Delta 2, standard in, 65-66; low achievement of Virginia cities (white) in, 55; median scores in cities outside Virginia higher than Virginia medians in, 57; median scores of grades in Virginia cities compared with Woody standard in, 58; medians for Virginia cities (white) compared with Woody standards in, 56; one-, two-, three-, and four-teacher schools compared with Haggerty standard for exercise two, Delta 2, in, 66; one-teacher, white and colored schools' achievement compared with Woody standards in, 64; organization of data in, 53; products of training in, 52; recommendations for remedial work in, 68; summary of results of, 11; Woody tests of, 11.
Arithmetical reasoning, 67.
Ayres spelling scale, 91.

Backward pupils, no provisions for, 12; special pupils for, 189.
Basis for grouping of pupils, 114, 131, 186, 202.
Bureaus of research, 191.

City schools (colored), arithmetic in, 62-64; handwriting in, 77, 79; irregular progress in reading of, 25; reading achievement in, 23; stay in school in, 25.
City schools (white), analysis of records of reading in, 28; arithmetic, spelling, and handwriting in, 11; bureaus of research in, 191; fundamentals in, 55; intelligence and composition achievement of pupils in, 203; intelligence of pupils in, 172; low achievement in arithmetic in, 55; overlapping of abilities in, 173; quality of handwriting in, 77; reading of pupils in, 10; Woody standards compared with median grade scores in, 58.
Classification measures, 125; efficiency of Delta 2 intelligence test as, 132.
Classification of pupils, 12; in high school, 202; tests as basis for, 125, 188.
Coefficient of correlation, 123.
Colored pupils, ages of, 12; arithmetic achievements of, 62, 64, 66; composition achievement of, 203; handwriting achievement of, 77, 79, 82; intelligence of, 166-171; median ages of one thousand rural, 28; reading achievement of, 23-28; spelling of, 103-107, 111; summary of achievements of, 10-12.
Comparative scores, technique of, 54.

Composition, achievement of colored pupils in, 203; conclusions concerning pupils' achievements in, 209; giving and scoring of tests in, 200; Hillegas scale for measuring, 200; number of pupils tested in, 198; poor and excellent samples of, 206-208; score for first-year high school classes in, 199, 203-205; summary of achievements in, 13; test in, 198; Virginia high school pupils compared with pupils elsewhere in, 200; Virginia Supplement and Hillegas scale in, 213.
Conditions influencing product of Virginia schools, 7.
Correlation, between teacher's rating and intelligence, 154; of mental and educational tests with criterion, 123; Pearson coefficient of, 129, 131, 132, 133, 137.
Correlation graphs, 127, 130, 132, 133, 134, 135, 136, 137, 150, 158.
Criteria for evaluating tests, 115.
Criterion, for measuring significance of tests, 124; how applied, 124.
Curricula, need for reorganization of, 205.

Delta 1 intelligence test, 2; character of, 146; discriminative capacity of, 147; norms for, 152; overlapping of pupils tested with, 182; reliability of, 151; scores of pupils tested with, 183-186; significance of, 151.
Delta 2 intelligence test, construction of, 3, 119; correlation of, with criterion, 123, 126, 127, 128, 129; correlation of, with criterion plus scores in handwriting, spelling, addition, and reading, 133; discriminative capacity of, 119-120; efficacy of, as tool for classification of pupils, 131, 138; norms for, 138; reliability of, 120; scores of Virginia pupils in, 162-171; significance of, 122.
Delta 4 record of pupils, 3.
Delta 7, 3.
Discriminative capacity of tests, 115.
Division of Tests and Measurements, in Virginia Survey, measurement program of, 11; work of, how and where begun, 1.

Educational tests, 2; correlation of, with criterion and mental tests, 123.
Elementary school pupils, basis for grouping of, 114.
Elimination in non-city schools, 21.
Examination as basis for grouping of pupils, 114.

Four-teacher schools, 21, 22, 27; achievement of pupils in, 11; arithmetic in, 60, 61, 66; compared with one-teacher schools in arithmetic, 63; handwriting in, 75, 81; intelligence in, 162, 163, 168, 169; median ages of pupils in, 28; reading in, 20, 21, 22, 27, 33; scores in arithmetic in, 63.
Freeman standards in handwriting, 8.
Fundamentals in Virginia cities, 55.

Gifted children, 190.
Grade location, as partial criterion for measuring value of tests, 124.
Grading, improvement of, 183, 188.
Grouping of pupils, 12, 157; bases for, 114; improvement of, in individual classes, 157; information blanks for, 187; intelligence examinations as aid to, 186; relative value of classification measures for, 125; remedial measures for, 188.

Haggerty standards, 139, 153.
Handwriting, 70; comparison of rural and city schools in, 78; comparison with Gary measures in, 89; deviation in, 89; directions for administering tests in, 70; errors in scoring results of, 85; errors in sampling of, 86; formula for correction of errors in scoring of, 86; "free choice" method of, 70; Freeman standards in, 75; individual differences in, 87; interpretation of

data on, 87; measures of quality of, 74; one-room rural schools in, 75; quality of, in city and rural schools, 77; rate of, 79, 80, 81; recommendations for improvement of, 90; reliability of results of, 84; scoring of samples of, 72; selection and training of scorer, 72; standing of various types of schools in, 74; Starch's measurement scale for, 72; variability of pupils in, 87.
Harrisonburg, arithmetic achievement of, 57, 60.
High schools, algebra achievement of, 23-25; classification basis for pupils in, 202; composition achievement in, 198, 203; composition and intelligence achievement in, 203; summary of achievement of pupils in, 12.
Hots, algebra tests, 223.

Individual differences in handwriting, 87.
Individual intelligence examinations, 115.
Instruction, fundamental aims of, in elementary school, 1.
Intelligence, Delta 1 test of, 146; Delta 2 tests of, 2; discriminative capacity of Delta 2 tests of, 119; description of Delta 2 tests of, 119; median scores for Virginia groups in, 172; overlapping in, 166; pupils' scores in, 161-171, 183-186; teachers' rating of, 153.

Measures, of quality of handwriting, 74; of rate of handwriting, 79.
Mental age, 115.
Misgrouping, 12; examples of, in Virginia schools, 159.
Multiplication scale, as a basis for classification, 134.

National Intelligence Tests, 122.
National Research Council, 2, 153.
Norms for, Delta 1, 152; Delta 2, 138; Sigma 1, 160.
Norms for comparison, requirements of a good test, 119.

One-room school, inefficiency of, 12.
One-teacher schools, 193; achievement in arithmetic in, 11, 60, 61, 66; ages of pupils in, 28; classes in, 193; compared with four-teacher schools in arithmetic, 63; consolidation, remedy for problem of, 196; importance of the problem of, 195; inferiority of, in arithmetic, 63-66; length of term in, 197; low achievement in, 194; need for better teachers and equipment in, 196; percentage of Virginia pupils taught in, 193; performance in intelligence tests of, 162, 164, 168, 169; reading in, 21, 22, 33; recommendations for, 195; state aid for, 196; work of teachers in, 193; writing in, 75, 81.
Overageness of Virginia pupils, 8.
Overlapping, of abilities of grades, 12; in intelligence, 166; of 6184 pupils in eighteen counties, 175; of 3541 pupils, by half grades, in eight Virginia cities, 178; of pupils tested with Sigma 1, 181; of pupils tested with Delta 1, 182.

Quartile, measure of deviation, 126.

Reading, achievement of city (colored) pupils in, 24; achievement of city schools in, 10; achievement of one-, two-, three-, and four-teacher schools in, 20, 21; achievement of rural schools in, 10; achievement of rural (white) schools in, 22; age in reading progress, 119; analysis of city records in, 28; analysis of class and individual records in, 33; as one aim of elementary instruction, 1; average and extreme scores for eight Virginia cities in, 30; comparative scores for rural white and colored pupils in, 27; estimated Virginia half-year standard in, 18; estimated Virginia mid-year standard in, 16; examination of larger groups in, 34; improvement of, 42; individual ages

and progress in, 39; intra-city variations of grade scores in, 31; low achievement of rural pupils (colored) in, 27; low and high scores in single cities in, 31; median number of questions correct in, of city (colored) pupils, 25-26; progress from grade to grade in, 19; results based on number of questions answered in, 19; scores of four classes in Ginter Park school in, 32; Sigma 1 test for, 2; summary of, in Virginia schools, 10; summary of recommendations for improvement of, 44; summary of results of, in Virginia, 40; supplementary material for, 42; Thorndike mid-year standard in, 16; Thorndike scale for measuring, 2, 14; variation of city grade scores in, 28; Virginia cities compared with outside cities in, 16; Virginia city scores compared with Virginia and Thorndike standard, 35; Virginia groups compared with 34 Wisconsin cities in, 33.

Reading, Primary, 45; achievement of pupils in Norfolk and Richmond in, 47; comparative scores for Richmond, Norfolk, and rural schools in, 49; inferior achievement of rural pupils in, 50; median scores for rural pupils in five counties in, 48; overlapping of pupils in, 181, 182; Sigma 1 test for, 46; variability of pupils in, 51.

Recommendations, for improvement of, arithmetic, 68; composition, 211; handwriting, 90; reading, 112; summary of, 13.

Record of pupils' scholarship, industry, intelligence, 3.

Reliability of tests, 116, 121.

Remedial work, recommendations for, in arithmetic, 68; recommendations for, in reading, 42; school grading, 180.

Results of survey, summary of, 9.

Richmond schools, emphasis on addition in, 138.

Rural schools, age and reading progress, 22; arithmetic achievement of colored pupils in, 62; arithmetic achievement of white pupils in, 60-61; arithmetic of pupils in, 11; comparative scores in reading in, 50; comparison of arithmetic achievement in one- and four-teacher schools, 63; comparison of colored and white pupils' achievement in arithmetic with Woody standard, 64; intelligence of pupils in, 162, 164, 168, 169; median age of white pupils in, 22; median scores in reading for primary pupils in, 48; overlapping in, 167, 174; quality of handwriting in, 77-79; rate of handwriting in, 80; reading in, 10, 20, 26, 27, 50; spelling in, 96, 97, 99, 101.

Samples of composition, 206-208.

Scope of the survey, 3.

Second-grade examination, 140.

Seven-grade-school course in Virginia, 7.

Sigma 1 reading test, as instrument for classification of pupils, 145; correlated with criterion, 142, 143, 144; discriminative capacity of, 40; median ages of pupils examined by, 50; number of pupils tested with, 46; overlapping of pupils tested with, 181; reliability of, 141; significance of, 141.

Significance, as criterion for evaluating tests, 118.

Silent reading, 138.

Special classes, 189, 190.

Spelling, absolute scores for city schools in, 102; Ayres scale for measuring, 91; comparison of Virginia pupils with standards in, 100; construction of scales for measuring, 92; deficiency of, measured by year-progress units, 104; deficiency of Virginia schools in, 107; methods of computing average absolute scores in, 98; methods of com-

puting and interpreting results of, 95; percentage of words spelled correctly, 95; point scale used in, 95; possibility of advance information by pupils in spelling, 109; recommendations in, 111; words used in test of, 93.
Stanford revision of Binet-Simon test, 4, 115, 188.
Starch handwriting scale, 12; correlation of, with criterion, 136.
Starch standards in handwriting, 72.
Statistical evaluation of methods, 115.
Summary, of conditions influencing product of the Virginia schools, 7; of recommendations for improving work in reading, 42; of results in reading, 10; of results of arithmetic test, 11; of spelling, 11; results of survey, 9.

Teacher's information blank, 187.
Teacher's judgment as basis for grouping, 114.
Teacher's ratings, as partial criterion for tests, 124; value of, 153; variation in, 155.
Technique of comparative scores in arithmetic, 54.
Testing, ages of pupils in, 28; handwriting in, 75, 87; intelligence of pupils in, 162, 163, 164, 168, 169; reading in, 21, 22, 27; representative schools chosen for, 4; three-teacher schools, arithmetic in, 60-61.
Tests, as aid to grading of pupils, 186; as classification measures, 125; character of tests used in survey, 2; criterion for evaluating, 115; criterion for measuring significance of, 124; Delta 2, 119; how given in survey, 3, 5; how mental and educational tests differ from ordinary examinations, 2; how reliability of tests may be determined, 117; lists of tests used in survey, 2; number of pupils examined by, 4.
Thorndike reading scale, Alpha two, 2, 14, 25, 30, 31; as basis for classification of pupils, 136; correlation of, with criterion, 136; mid-year standard for, 16; number of pupils tested with, 14.
Two-teacher schools, ages of pupils in, 28; arithmetic in, 61, 66; handwriting in, 75, 91; intelligence of pupils in, 162, 164, 168, 169; reading in, 20, 27.

Variability of pupils, in handwriting, 87; in primary reading, 51; limits of, for correct grouping, 167; measures of, 126.
Virginia public schools, achievement of pupils in, 10, 16, 17; arithmetic in, 52; composition and intelligence performance of pupils in, 203; grouping of pupils in, 157; handwriting in, 70; how pupils classified in, 12; intelligence of pupils in, 161, 171; median age of rural white pupils in, 22; reading in, 40; seven-grade course in, 7; summary of conditions influencing product in, 7; summary of results and recommendations for, 7.

Woody arithmetic scales, correlation of addition in, with criterion, 123; discussion of, 52, 60, 61; standards for, 56, 61, 62, 64.

HAGGERTY INTELLIGENCE EXAMINATION

By M. E. HAGGERTY

Dean of the College of Education, University of Minnesota

DOCTOR HAGGERTY'S examinations, prepared after his early experience, years ago, at the University of Indiana, after his work as Major in the Surgeon General's Office during the war, and after he had completed his famous state survey of Virginia and many cities, is most unusually successful. The tests possess many exclusive features and several special advantages. They are thoroughly standardized and have been exceptionally successful in use in nearly all parts of the world.

DELTA 1 (for grades 1–3).
Can be given in thirty minutes. A group examination, and contains five non-verbal tests and one verbal test. Arranged with a preliminary exercise for each test. Nearly every page is illustrated. The examination is printed in a booklet of twelve pages, measuring 8½×11 inches. Put up in packages of 25 examination booklets with 1 Class Record. *Price $1.50 net.*

KEY FOR DELTA 1. A four-page card the size of the examination booklet. Illustrated in colors. *Price 15 cents net.*

DELTA 2 (for grades 3–9).
Combines parts of the several army examinations in a single battery which can be given to classes or even in groups as large as 500 in the short space of thirty minutes. The results will be most satisfactory. The booklet is illustrated and comprises six tests which are modifications of the army intelligence tests Alpha and Beta. The examination is printed in a booklet of eight pages, measuring 8½×11 inches. Put up in packages of 25 examination booklets with 1 Class Record. *Price $1.50 net.*

KEY FOR DELTA 2. A two-page card the size of the examination booklet. Illustrated in colors. *Price 10 cents net.*

MANUAL OF DIRECTIONS.
Contains complete and detailed directions for giving and scoring. Indicates the proper interpretation of results and gives a brief discussion of the means of improving school work based on the results of the tests. Very reliable age norms and grade standards are included. Answers many pertinent questions about tests and testing. Directions for giving and scoring the *Reading Examination: Sigma 1* (about which further information will be furnished gladly) are also given. 64 pages. *Price 40 cents net.*

SPECIMEN SET. An envelope containing: 1 Intelligence Examination: Delta 1; 1 Intelligence Examination: Delta 2; 1 Key for each examination; 1 Class Record for each examination; 1 Manual of Directions. *Price 65 cents postpaid.*

Prices are net, transportation extra. Specimen sets are sent postpaid.

WORLD BOOK COMPANY

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

HAGGERTY READING EXAMINATION

THESE tests were arranged and standardized by Dr. M. E. HAGGERTY, Dean of the College of Education of the University of Minnesota, who has had a long and special preparation in making and standardizing tests. He was assisted in the preparation of the Sigma 1 test by MARGARET E. NOONAN of Harris Teachers College, St. Louis, and by LAURA C. HAGGERTY in the preparation of the Sigma 2 and 3. The tests are definite measures of the performance of children in reading. They represent standards which can be used to give a quantitative value to the teaching of reading. They are group tests. The scores made with the tests correlate closely with other measures of school progress.

SIGMA 1 (for grades 1–3).
Combines a reading test with an intelligence test. A new type of test. Illustrations and other features attractive to children. Consists of four fore-exercises, a first test with 25 parts, and a second test with 20 parts, which can be given in 30 minutes. The examination is printed in a booklet of eight pages, measuring 7×8½ inches. Put up in packages of 25 examination booklets, with 1 Class Record. *Price $1.40 net.*

KEY FOR SIGMA 1. A one-page card the size of the examination booklet. *Price 5 cents net.*

SIGMA 2 (for grades 3–8) and KEY FOR SIGMA 2. *In preparation.*

SIGMA 3 (for grades 5–12).
Consists of three tests: vocabulary, sentence reading, and paragraph reading. Each test is preceded by directions for the pupil and a fore-exercise showing what is to be done in the test. With the exception of the last paragraph all the material was selected from textbooks generally in use. The examination is printed in a booklet of eight pages, measuring 8½×11 inches. Put up in packages of 25 examination booklets with 1 Class Record. *Price $1.50 net.*

KEY FOR SIGMA 3. A two-page card the size of the examination booklet. *Price 10 cents net.*

MANUAL OF DIRECTIONS.
Gives full information on conducting and scoring SIGMA 1 and SIGMA 3 and on interpreting results. The use of intelligence tests in connection with achievement tests is pointed out. Criteria by which to judge the value of tests are discussed in detail. The manual contains comprehensive norms for SIGMA 1 and provisional age norms and grade standards for SIGMA 3. Directions for SIGMA 2 will be included when the examination is published. 48 pages. *Price 30 cents.*

SPECIMEN SET. An envelope containing: 1 Reading Examination: Sigma 1; 1 Reading Examination: Sigma 3; 1 Key for each examination; 1 Class Record; 1 Manual of Directions. *Price 50 cents postpaid.*

Prices given are net, transportation extra. Specimen sets are sent postpaid.

WORLD BOOK COMPANY

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

HUDELSON ENGLISH COMPOSITION SCALE

By Earl Hudelson

Professor of Secondary Education, West Virginia University

THIS scale for evaluating English composition work is evenly graded in steps of .5, so that teachers untrained in the use of such devices may handle it. This constitutes its greatest improvement over other scales now in use.

Its construction is similar to that of the Hillegas Scale, since the compositions upon which it is based were scored on the Nassau County Supplement to the Hillegas Scale. Only two of the sixteen sample compositions composing the Hudelson Scale were not written by school children.

This scale is a reliable measure of writing ability. The scores obtained from its use may be used

In classifying pupils in English composition
In determining
  the improvement of groups, or
  their actual achievement as compared with known standards
In selecting the best method of instruction for a given class.

Advantages will be found in the directions for use of the scale and the directions for training of scorers through practice on thirty compositions. A table of norms based on scores made throughout the country is also included.

Kraft. vii + 46 pages

Price 60 cents

WORLD BOOK COMPANY

Yonkers-on-Hudson, New York
2126 Prairie Avenue, Chicago

COURTIS STANDARD PRACTICE TESTS *in Handwriting*

By

S. A. Courtis *and* Lena A. Shaw

Director of Educational Research, Supervisor of Penmanship, Detroit Public Schools

THIS material, like the Courtis Standard Practice Tests in Arithmetic, is thoroughly standardized. Three years' trial in schools, before it was placed on the market, left no doubt of its success in use.

Convinced that writing is a trick which the pupil must learn for himself, though his teacher may help him at times, the authors have placed before the child definite, attainable goals, based on standards, and have provided exercises that enable him to reach those goals. Through these exercises, the individual needs of the children are met, and the routine of classroom work is avoided. Children learn quickly how to use the material, and enjoy using it.

Research and supervisory tests are included in the material; by their use it is easy to discover just what kind of drill work children need, and how much.

The results from using the tests are very remarkable, many instances showing that even with less practice time than usual, children doubled their speed and quality of writing when they had used the Courtis Standard Practice Tests in Handwriting.

Bulletin No. 1 gives complete information on the material.

Student's Daily Lesson Book. *10 cents net.*
Student's Daily Record Card (including **Graph Blank**). *3 cents net.*
Teacher's Manual (including **Class Record — Research Tests**). *25 cents net.*
Class Record. (Daily Scores and Time Cost, for teacher's use.) *5 cents net.*
Specimen Set. *50 cents postpaid.*

WORLD BOOK COMPANY

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

STANDARD TESTS *of* ACHIEVEMENT *and* INTELLIGENCE. *Also* PRACTICE TESTS

Prepared by experts only

COURTIS Standard Practice Tests in Arithmetic: 1920 Revision. Cabinet No. 1, $9.00 net; Cabinet No. 2, $7.00 net; Cabinet No. 3, $2.75 net; Student's Record and Practice Pad, 16 cents net; Teacher's Manual, 40 cents net; Teacher's Record, 5 cents net; Research Cards, 90 cents net; Extra Lesson Cards, 1 to 48: Form A, 90 cents net; Lesson Cards 1 to 48: Form B, 90 cents net; Extra Lesson Cards, 60 cents net; Specimen Set, $1.50 postpaid.

COURTIS Standard Practice Tests in Handwriting. Student's Daily Lesson Book, 10 cents net; Student's Daily Record Card and Graph Blank, 3 cents net; Teacher's Manual, including Class Record: Research Tests, 25 cents net; Class Record: Daily Scores and Time Cost, 5 cents net; Scale for Measuring Handwriting, 10 cents net; Specimen set 50 cents postpaid.

HAGGERTY Intelligence Examination. Delta 1 package, $1.50 net; Key for Delta 1, 15 cents net; Delta 2 package, $1.50 net; Key for Delta 2, 10 cents net; Manual of Directions, 40 cents net; Specimen Set, 65 cents postpaid.

HAGGERTY Reading Examination. Sigma 1 package, $1.40 net; Key for Sigma 1, 5 cents net; Sigma 3 package, $1.50 net; Key for Sigma 3, 10 cents net; Manual of Directions, 30 cents net; Specimen Set, 50 cents postpaid.

HANDSCHIN Modern Language Tests. Silent Reading Test A: French package, $1.00 net; Silent Reading Test B: French package, $1.00 net; Silent Reading Test A: Spanish package, $1.00 net; Silent Reading Test B: Spanish package, $1.00 net; Comprehension and Grammar Test A: French package, $1.00 net; Specimen Set, 20 cents postpaid. (Packages include directions and keys.)

HUDELSON English Composition Scale. vii+46 pp. 60 cents.

HAGGERTY, TERMAN, THORNDIKE, WHIPPLE, YERKES National Intelligence Tests. Scale A: Form 1 or 2 package, $1.60 net; Scale B: Form 1 or 2 package, $1.60 net; Manual of Directions, 25 cents net; Specimen Set, 50 cents postpaid. Packages include keys.

OTIS General Intelligence Examination. Examination package with Manual and Key, $1.00 net; Specimen Set, 10 cents postpaid.

OTIS Group Intelligence Scale. Primary Examination: Form A package, $1.50 net; Primary Examination: Form B package, $1.50 net; Advanced Examination: Form A package, $1.50 net; Advanced Examination: Form B package, $1.50 net; Manual of Directions, 40 cents net; Examiner's Key, 25 cents net; Specimen Set, 75 cents postpaid.

TERMAN Group Test of Mental Ability. Examination: Form A package, $1.60 net; Examination: Form B package, $1.60 net; Specimen Set, 15 cents postpaid. (Packages contain Manuals and Keys.)

WILKINS Prognosis Test in Modern Languages. Tests packages, $1.60 net; Specimen Set, 10 cents postpaid. (Packages contain Manual.)

Most packages contain Class Records. All packages contain examination blanks for 25 pupils, except the Handschin tests which contain blanks for 50 pupils. All prices net, transportation additional, except for specimen sets which are sent postpaid when cash accompanies the order. Circulars describing the tests more in detail will be sent on application, also a 32-page Brief Treatise on Tests. Other tests are in active preparation.

WORLD BOOK COMPANY

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

Complete list of the

School Efficiency Series

Edited by PAUL H. HANUS, of Harvard University

"One of the most noteworthy undertakings in professional education of the century." — PROFESSOR C. H. JOHNSTON, *University of Illinois*

FRANK P. BACHMAN. Problems in Elementary School Administration. *Cloth. x+272 pages. Price $2.25.*

FRANK W. BALLOU. High School Organization. *Cloth. Price $2.25.*

S. A. COURTIS. Standards in Arithmetic. *In preparation.*

ELLWOOD P. CUBBERLEY, FLETCHER B. DRESSLAR, EDWARD C. ELLIOTT, J. H. FRANCIS, FRANK E. SPAULDING, and LEWIS M. TERMAN. The Portland Survey. *Cloth. xiv+441 pages. Price $2.25.*

CALVIN O. DAVIS. High School Courses of Study. *Cloth. Price $2.25.*

EDWARD C. ELLIOTT. City School Supervision. *Cloth. Price $2.25.*

HENRY H. GODDARD. School Training of Defective Children. *Cloth. $1.80.*

PAUL H. HANUS. School Efficiency: A Constructive Study. *Cloth. $1.80.*

FRANK M. MCMURRY. Elementary School Standards. Instruction: Course of Study: Supervision. *Cloth. xii+218 pages. Price $2.25.*

ERNEST C. MOORE. How New York City Administers Its Schools: A Constructive Study. *Cloth. xii+322 pages. Price $2.25.*

HERMAN SCHNEIDER. Education for Industrial Workers. *Cloth. $1.80.*

GEORGE D. STRAYER, FRANK P. BACHMAN, ELLWOOD P. CUBBERLEY, WILLIAM T. BAWDEN, and F. J. KELLY. Some Problems in City School Administration. *Cloth. xii+234 pages. Price $2.25.*

FRANK V. THOMPSON. Commercial Education in Public Secondary Schools. *Cloth. xiv+194 pages. Price $2.25.*

Books sent postpaid on receipt of price
Illustrated catalog of the Series for the asking

WORLD BOOK COMPANY

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

School Efficiency Monographs

Constructive educational books of handy size covering many educational activities named in the order in which they were issued

THE PUBLIC AND ITS SCHOOL
By William McAndrew
Treats educational matters in a big way. Illustrated. *90 cents.*

STANDARDS IN ENGLISH
By John J. Mahoney
A course in study in composition for elementary schools. *$1.35.*

AN EXPERIMENT IN FUNDAMENTALS
By Cyrus D. Mead
Gives results from practice material. Illustrated. *90 cents.*

NEWSBOY SERVICE
By Anna Y. Reed
Of value to those interested in the Smith-Hughes Act. *$1.35.*

EDUCATION *of* DEFECTIVES *in the* PUBLIC SCHOOLS
By Meta L. Anderson
A thoroughly readable and instructive book. *$1.20.*

RECORD FORMS FOR VOCATIONAL SCHOOLS
By Joseph J. Eaton
Forms showing ways to introduce efficiency methods. *90 cents.*

RURAL EDUCATION *and the* CONSOLIDATED SCHOOL
By Julius B. Arp
The problems of the rural school. Illustrated. *$1.35.*

PROBLEMS IN STATE HIGH SCHOOL FINANCE
By Julian E. Butterworth
A vast amount of data for school officials. *$1.35.*

COMMERCIAL TESTS AND HOW TO USE THEM
By Sherwin Cody
A working handbook of the National Business Ability Tests. *$1.35.*

THE RECONSTRUCTED SCHOOL
By Francis B. Pearson
Discussion of the real problems in the work of reconstruction. *$1.25.*

THE TEACHING OF SPELLING
By Willard F. Tidyman
The only method book written since the famous investigations. *$1.35.*

Other volumes in active preparation
Prices are for kraft bound books

WORLD BOOK COMPANY
Yonkers-on-Hudson, New York
2126 Prairie Avenue, Chicago

Educational Survey Series

A carefully selected list of the best new educational survey material available

SELF-SURVEYS BY COLLEGES AND UNIVERSITIES
By WILLIAM H. ALLEN

With a referendum to college and university presidents. A practical, workable book. Illustrated. *Cloth.* $3.00.

SELF-SURVEYS BY TEACHER-TRAINING SCHOOLS
By WILLIAM H. ALLEN *and* CARROLL G. PEARSE

A book of questions with analyses of answers and tabulation of results; problems of administration, and instruction. Illustrated. *Cloth.* $2.25.

SCHOOL ORGANIZATION AND ADMINISTRATION
By ELLWOOD P. CUBBERLEY, and 4 Associates

Based on the Salt Lake City survey. There are 47 diagrams and charts. *Cloth.* $3.00.

SURVEY OF THE ST. LOUIS PUBLIC SCHOOLS
By CHARLES H. JUDD and a Staff of 15 Associates

I. Organization and Administration.
II. The Work of the Schools.
III. Finances.

The most important school survey made in 1918. Illustrated. *Cloth.* Sold only in sets of three volumes. $7.50.

VIRGINIA PUBLIC SCHOOLS
By HARRIS HART, ALEXANDER J. INGLIS, and a Survey Staff of 10 Division Specialists, 22 Special Collaborators, and 9 Special Consultants.

I. Report of Education Commission and Survey Staff.
II. Tests and Measurements. *In press.*

The first extensive survey of a Southern state, first to use group intelligence tests, first to inquire into specific problems, such as negro education, etc. Illustrated. *Cloth. Part I,* $3.00.

THE BOISE SURVEY
By JESSE B. SEARS, assisted by WM. M. PROCTOR *and* J. HAROLD WILLIAMS

A concrete study of the administration of a small city school system. Illustrated. *Cloth.* $2.70.

Other volumes are in preparation
Detailed description of each book sent on request

WORLD BOOK COMPANY
YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

To avoid fine, this book should be returned on
or before the date last stamped below

50M—9-40

[redacted]

JAN 0 3 1999

379.75
V2vev
2

The Virginia Education commission. 647984
Virginia public schools.

NAME	DATE	NAME	DATE

LIBRARY, SCHOOL OF EDUCATION, STANFORD

647984

Stanford University Libraries
3 6105 006 514 066

379.75
V2vev
pt.2

To avoid fine, this book should be returned on
or before the date last stamped below

50M—9-40

[redacted]

JAN 0 3 1999